DEVELOPMENT OF THE BASE SUPPORT PLAN
PROCESS MODEL FOR EVALUATION OF
PROPOSED PROCESS IMPROVEMENT INITIATIVES

THESIS

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Abstract

The primary role of the United States Air Force (USAF) logistics planner is to plan for war. For the wing level logistics planner, an important war planning product they are responsible for is the base support plan (BSP). The BSP is the installation level plan to support unified and specified command wartime operations plans, as well as MAJCOM supporting plans. Two Armstrong Laboratory sponsored initiatives exist to automate and enhance some of the BSP processes: the Survey Tool for Employment Planning (STEP) and Beddown Capability and Assessment Tool (BCAT).

This research explored the BSP process and improvement initiatives by (1) flowcharting the current process, (2) establishing where in the current process STEP and BCAT play a role, (3) developing a spreadsheet model of the process using Microsoft Excel and the program evaluation and review technique (PERT) for quantifying any possible BSP scenario, and (4) computing the estimated time savings STEP and BCAT can provide the USAF in one of its areas of responsibility.

The results of this research are threefold. First, a detailed BSP process map now exists filling a void experienced by logistics planners at all levels. Second, a model using Excel and PERT is available for users interested in improving their BSP process. This model can be adapted to any BSP scenario. And, finally, the model showed the average time to complete a BSP with and without STEP and BCAT are significantly different.

DEVELOPMENT OF THE BASE SUPPORT PLAN PROCESS MODEL FOR EVALUATION OF PROPOSED PROCESS IMPROVEMENT INITIATIVES

I. Introduction

General Issue

The primary role of the Air Force logistics planner is to plan for war. For the wing level logistics planner, this war planning takes on many forms: exercise, contingency, deployment, employment, reception, beddown and support. This research will focus on the process to develop the base support plan (BSP). The BSP is the installation level plan to support unified and specified command wartime operations plans, as well as MAJCOM supporting plans (8; 9).

To simplify the planning process and facilitate communication between deploying wings and beddown bases, the BSP is created in two parts. Part 1 of the BSP documents the total resources and capabilities from some operating location. Part 2 of the BSP takes those resources and capabilities quantified in Part 1 and assesses the capability for a variety of employment driven requirements.

The office of primary responsibility for the development of the BSP is the wing logistics plans office. They manage the efforts of all the base's functional areas in this development process much like that of managing a complex project. Previous research found that up to one half the logistics planners are inexperienced in base support planning and some kind of training tool is needed (32). This problem, though old, was reiterated at

the World Wide Base Support Planning Conference which was held at HQ CENTAF from 14 to 16 January 1997. "There is a desperate need for training and education for logistics plans officers. The lack of good education and training puts a heavy burden on the NCOs to take up slack" (12).

To properly create a BSP, wing logistics planners must rely on information from many sources and various computer systems designed to provide this information or help determine requirements and capabilities. In 1995, Armstrong Laboratory, Wright-Patterson Air Force Base, Ohio, published a technical report that described the current and planned wing logistics planning environment (of which base support planning is a subset). They found numerous problems with these information sources as well as the currently used software systems. Many of the problems were being addressed by the Air Force by fielding a suite of integrated software systems, but some of the fundamental shortcomings of the current planning process are not addressed (24).

To address the fundamental shortcomings in the current and planned deployment and support planning environments, Armstrong Laboratory is sponsoring a package of integrated initiatives under the umbrella known as Logistics Contingency Assessment Tool (LOGCAT). Two components of LOGCAT are the primary focus of this research: Survey Tool for Employment Planning (STEP) and Beddown Capability and Assessment Tool (BCAT). STEP will use advanced integration of computer hardware and software to automate the collection, storage, and retrieval of deployment site survey or BSP Part 1 information. BCAT will use advanced database design to compare deployment site force

beddown capabilities against deploying forces beddown requirements and produce a list of shortages and overages which will assist in the development of the BSP Part 2.

Current fiscal constraints associated with the defense drawdown impose tight restrictions on acquisition of the tools and systems under development. To justify new systems, processes should be clearly defined and improved before warranting further expenditures on automation and new technologies. Even then, new systems must be cost effective, save time, and/or enhance processes before the users of these systems will issue funds to buy them.

Problem Statement

The future of the Armstrong Laboratory's research and development initiatives, STEP and BCAT, may hinge on the potential time savings realized through their implementation. In order to quantify any savings from inserting this technology, a comprehensive definition of the BSP development process must be designed with and without the integration of STEP and BCAT. To date, there is no clearly defined or mapped process describing the development of BSPs from the receipt of the initial tasking to BSP completion. Specifically, Headquarters USAF, Plans and Crisis Action (AF/ILXX) through Armstrong Laboratory, Logistics Research Division (AL/HRG) is interested in (1) the process definition not only as a "straw man" for process improvements, but overall training and education of logistics plans personnel, and (2) the time STEP and BCAT could save the Air Force over the existing BSP process.

Research Objectives

This thesis research will be conducted in four phases to address the stated problems. The objective of each phase must be met before proceeding to the next phase.

The objective of phase 1 is to develop a BSP process map that will be applicable to all BSP scenarios. These scenarios range form CONUS bases where only a BSP Part 1 is required through a bare base beddown of an Air Expeditionary Force which requires a BSP Part 1 and Part 2.

The objective of phase 2 is to define where STEP and BCAT will fit into the BSP process developed in phase 1.

The objective of phase 3 is to develop a mathematical model of the processes from phases 1 and 2 to facilitate a time savings analysis. The principles of the program evaluation and review technique (PERT) will be used to model and analyze the BSP development process.

The objective of phase 4 is to determine the time savings STEP and BCAT will provide the USAF using the models specified in phase 3.

Armstrong Laboratory and AF/ILXX will use the BSP process map as a framework for future BSP automation initiatives and training and education efforts.

Research Questions

To meet the objectives of this study, the following research questions were developed:

1. What is the "as is" (current) BSP development process?

2. What is the "to be" BSP process which incorporates STEP and BCAT?
3. What sub-processes are STEP and/or BCAT supposed to replace, duplicate or enhance?
4. What are the time differences between the "as is" and " to be" BSP processes?

Methodology

This research will begin with an extensive review of literature and consultation with experts to define the BSP process. From the data gathered, the entire process will be mapped. Discussions will be conducted with contractors and AL/HRG managers. STEP and BCAT will be evaluated to define where these proposed tools fit into the BSP process. Then the methods of PERT will be used to build the model and treat the BSP development process as a project to be managed. Data from experts in the process will be applied to the model through appropriate probability distributions. Times to complete BSPs will be computed by running the models and analyzed using appropriate statistical techniques.

Assumptions and Limitations

The BSP process flowchart created in the first phase represents only the deliberate planning process. The deliberate planning process is explained in detail in Chapter II. The PERT methodology used to model the process has inherent limitations, which are specifically concerned with its underlying assumptions. Chapter III provides an in depth discussion of these limitations and this research's efforts to dampen the effects. Additionally, the PERT model focuses on the Pacific Air Forces theater of operation

based on the availability of experienced personnel and its history in the development of the base support planning process.

Summary

This chapter described the base support plan, some problems in the current planning environment, and current initiatives to remedy those problems. This research will attempt to determine whether STEP and BCAT can provide cost and/or time savings over the current base support planning process. To do this, the entire BSP process must first be defined. This BSP process map can be used as a framework for future BSP education and training initiatives as well as process improvements. The problems will be addressed in four phases each phase with it's own objective. To meet these objectives, specific research questions were developed. Finally, the methodology to answer the research questions and meet the objectives was briefly described along with the basic assumptions and limitations of the study.

The following chapters explain the steps taken to address the research problem statement. In Chapter II, an overview of base support planning is provided by reviewing Department of Defense publications and literature covering base support planning and automation technologies. Chapter III provides a detailed methodological process chosen to meet the objectives of this research. In Chapter IV, the results of this research are analyzed and presented. Finally, Chapter V synthesizes this research and discusses implications for the Air Force and recommendations for future research.

II. Background

Chapter Overview

Base support plans are supporting plans to operational plans and are required to be written by the base level planner. In order to understand the requirements for producing a Base Support Plan, a brief overview of the planning process from the initial conception of national strategy leading to BSP development is in order. National strategy, driven by events in the world climate, is the driver for strategic planning. Strategic planning presents a broad concept of how the United States will react to certain anticipated events that might occur on the world stage. Supporting plans are written to further define how the mission of the armed services will be performed in the event the strategic plan is initiated. Base support plans are an integral part of the supporting plan category. The following discussion is a broad overview of the development of national strategy, the drivers that set up the strategic planning environment, the development of joint operational plans, crisis action planning, the development of base support plans, and initiatives in improving the base support planning process.

National Strategy

Strategic planning is conducted in a two year cycle. Four interrelated systems play a part in the development of military strategy and joint operational planning: (1) the National Security Council System (NSCS); (2) the Joint Strategic Planning System

(JSPS); (3) the Planning, Programming, and Budgeting System (PPBS); and (4) the Joint Operations Planning and Execution System (JOPES).

National Security Council System. The National Security Council System is "the principle forum for deliberation of national security policy issues requiring Presidential decision" (7:12). It is in this system that national strategy and policy are developed (Figure 2-1). The Chairman of the Joint Chiefs of Staff (CJCS) regularly attends National Security Council (NSC) meetings in order to present the views of the Joints Chiefs of Staff (JCS) on national strategy and policy matters. NSCS decisions are formed into the National Security Decisions Document (NSDD) which implements national security policy. NSCS decisions are the basic foundations for military programming (PPBS) and planning (JSPS) systems. Guidance for the conduct of time-sensitive planning and execution, as in contingency operations, may flow through the NSCS (1:2-2).

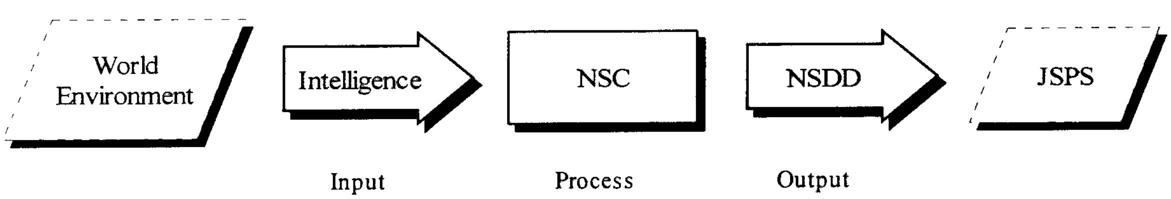

Figure 2-1. National Security Council System

Joint Strategic Planning System. The Joint Strategic Planning System (JSPS) is the forum in which the CJCS is able to carry out his responsibilities which include reviewing the national security environment and national security objectives, evaluating threats to national security, assessing current military strategy and existing or proposed

military programs and budgets, and propose changes to military strategy, programs, or forces necessary to achieve national military objectives (Figure 2-2) (5:2). A key element in the JSPS to military planning is the Joint Strategy Review (JSR) which initiates the strategic planning process. The JSR is the "JSPS process for gathering information, raising issues, and facilitating the integration of the strategy, operational planning, and program assessments" (7:12). The JSR is a review process conducted by the Armed Service components, unified and specified combatant commands on threats, technologies, organizations, doctrine, force structures and military missions, current strategy, forces, national security objectives (5:2). The results of this review are then presented to the JCS and CJCS. The key product of this process is the Chairman's Guidance (CG) which provides guidance and support for the development of the next National Military Strategy Document (NMSD), Joint Strategic Capabilities Plan (JSCP), and the Chairman's Program Assessment (CPA), an important element in the military programming cycle. Generally, the CG summarizes the results of the JSR and provides guidance and direction to planners in the joint planning process.

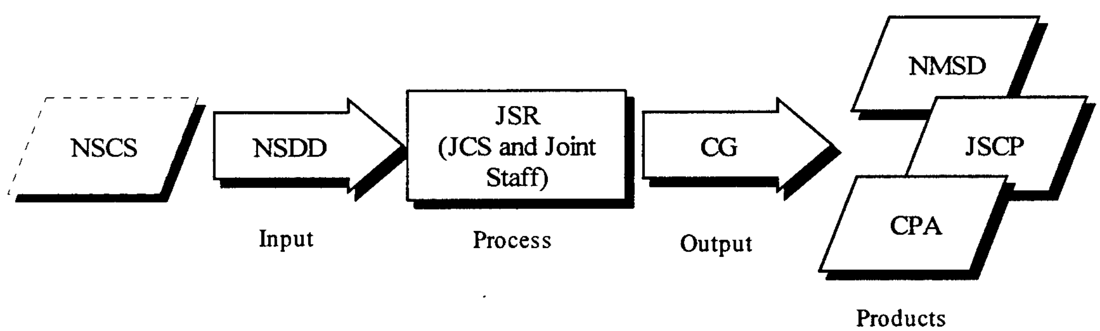

Figure 2-2. Joint Strategic Planning System

Planning, Programming and Budgeting System. The production of the National Military Strategy Document (NMSD) brings the planning process into the Planning, Programming and Budgeting System (PPBS). The PPBS is a resource management system for the Department of Defense (DoD) that is to provide needed weapons systems and support to the warfighting commands' mission of countering threats to national security within fiscal constraints. The system has three phases: (1) planning, (2) programming, and (3) budgeting (Figure 2-3).

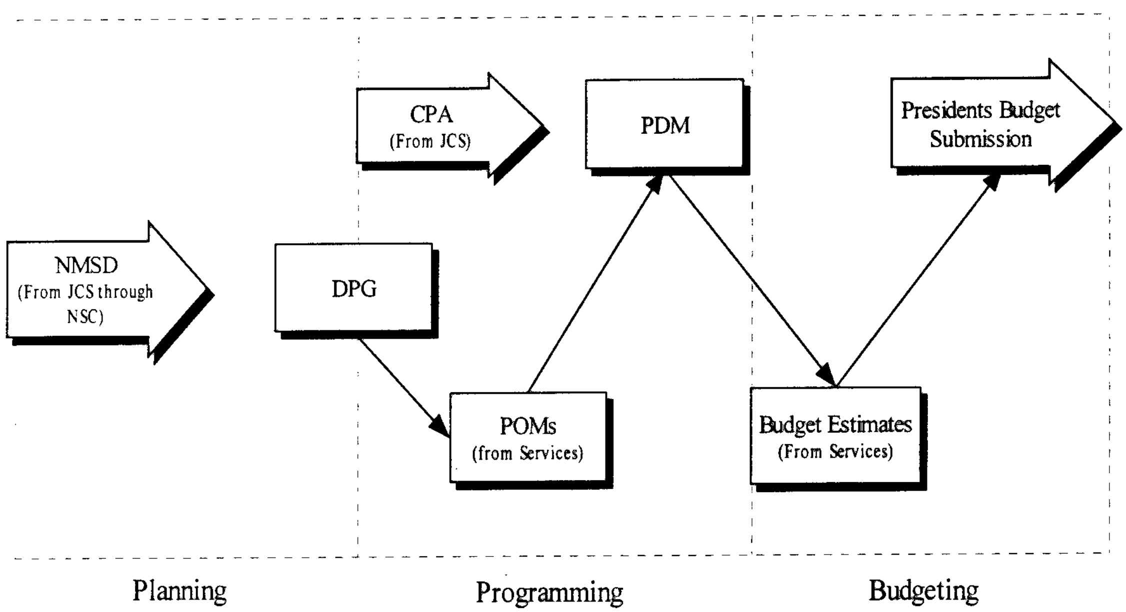

Figure 2-3. Planning, Programming, and Budgeting System

The NMSD initiates the planning phase in PPBS. It serves as guidance and advice to the President, the NSC, and the Secretary of Defense (SECDEF) on national military strategy and force structure needed to attain the national security objectives prescribed in the NSDD. Its purpose is to provide advice to the SECDEF on planning,

programming and budgeting matters for the DoD over the next planning cycle. The SECDEF uses the advice from the NMSD to build the Defense Planning Guidance (DPG) which is considered the link between planning and programming (7:14). The DPG provides guidance to the military departments in the preparation of their Program Objective Memorandums (POMs) in terms of objectives and fiscal constraints in meeting those objectives. The POMs are submitted to the JCS by the military departments which relay information regarding the amount of manpower and forces required to meet the stated objectives in the DPG. These POMs are reviewed by the JCS and then recommendations concerning the POMs are forward to the SECDEF for submission into the CPA. The CPA is later combined with recommendations from the Defense Planning and Resources Board (DPRB) to create the Program Decision Memorandum (PDM). The PDM reflects the changes in the service POMs and marks the end of the Programming phase and initiates the Budgeting phase. It is during the Budgeting phase that the services and the SECDEF make the budget estimations for the upcoming fiscal year to be included in the Presidents Budget Submission.

The cycle between planning and programming link is complete. Planning is made from assessing threat of national security versus existing resources available to meet that threat (manpower, equipment, budget). If it is decided that current resources are lacking to counter the threat, a move toward programming for additional resources is initiated. The result of the programming readjusts the baseline for planners to make their assessment of meeting the threat to national security. It is important to note that this process takes place over a two year period.

As stated earlier, the JSCP is a product of the JSPS. The JSCP "contains guidance to commanders of unified and specified commands and the Chiefs of the Services for the accomplishment of military tasks in the short-range period (2-3 years)" (7:15). The JSCP is prepared biennially, in most cases, and is derived from information present in the DPG and the Contingency Planning Guidance (CPG) prepared by the SECDEF. The CPG is produced annually and provides guidance for contingency action planning. The JSCP is essential in terms of JOPES and provides two important functions: (1) it is the primary document tasking supported and supporting commanders to produce joint plans, and (2) it apportions forces (manpower, weapons systems, support) to these commanders for deliberate and crisis planning, and execution.

Joint Operational Planning and Execution System. The first three systems defined the need for planning and programming, how the two phases are interrelated and their importance in determining national security policy. The Joint Operational Planning and Execution System is the final system of the four major systems that play a part in the development of military strategy and joint operational planning. JOPES is the "joint command and control system for conventional operation planning....JOPES translates force allocation and planning tasks into adequate, feasible, executable OPLAN (Operational Plan) and Operation Orders (OPORD)" (5:16). It is governed by three volumes which outline guidance in peacetime and crisis action planning, development and format of OPLANs , and describe the Automated Data Processing (ADP) support of JOPES.

OPLAN Development

Deliberate planning is defined as:

> the JOPES process involving the development of joint OPLANs for contingencies identified in joint strategic planning documents. Conducted principally in peacetime, deliberate planning is accomplished in prescribed cycles that complement other DoD planning cycles and in accordance with the formally established Joint Strategic Planning System. (10:II-15)

The deliberate planning process is initiated through the taskings defined in the JSCP. These taskings are directed to the unified and specified commanders to generate a plan to counter an identified threat to national security in their area of responsibility (AOR). The unified or specified commander assigns the task to the various service component commanders to begin the planning process. The planning process consists of five phases: (1) Initiation; (2) Concept Development; (3) Plan Development; (4) Plan Review; and (5) Supporting Plans (Figure 2-4) (7:20).

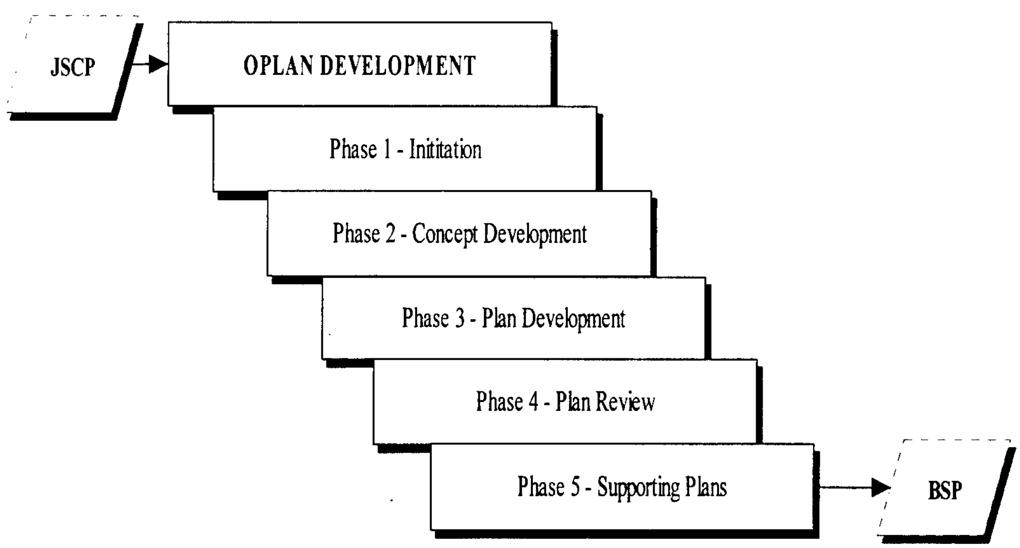

Figure 2-4. OPlan Development

Phase 1 - the Initiation phase is the initial act of assigning planning tasking and the apportionment of transportation and combat forces to the various service component commanders. The Air Force uses the War and Mobilization Plan (WMP) to determine available forces for joint planning. The WMP is divided into six volumes. Volumes 1, 3, and 5 provide planning guidance to Air Force planners. Volume 1 provides basic planning guidance from HQ USAF for mobilization planning and combat forces support in wartime. Volume 3 is considered the starting document for USAF War Planning and is divided into three parts: combat forces, support forces, and Unit Type Codes (UTCs). It is within Volume 3 that apportioned JSCP forces are translated into actual specific aircraft and unit type requirements (19).

Phase 2 - the Concept Development phase is the determination of the mission by the combatant commander to be performed from the assigned tasking. A Course of Action (COA) is determined and sent to the CJCS for review and approval. An approved COA becomes the Concept of Operations for that plan.

Phase 3 - support requirements for the Concept of Operations (CONOPs) are then determined in the Plan Development phase. Forces are selected and time phased and transportation requirements are determined to support the CONOPs. This creates the Time Phased Force Deployment Data (TPFDD). The phase ends with a completely developed OPLAN. The Plan Review phase, Phase 4, is a feasibility and validation review of the OPLAN by the CJCS.

Phase 5 - the final phase, Supporting Plan phase, is the most importance phase of this research. In this phase, each subordinate and supporting commander identified with

a tasking in the completed OPLAN must generate plans to explain how the tasking will be accomplished. It is from these taskings that the need for Base Support Plans (BSPs) are derived.

Base Support Planning

"The objective of base support planning is to identify total base capabilities and assess supportability of wartime contingency operations" (8; 9:1.1). BSPs are divided into two parts. BSP Part 1 is an unclassified document that identifies total resources available for use at a given location. These resources include facilities, vehicles, available billeting, airfield parking, fuel storage capabilities, etc. The BSP Part 2 is a classified document that compares the available resources, identified in the BSP Part 1, to requirements identified in various other source documents (OPLANs, TPFDD, Wartime Aircraft Activity Report (WAAR), etc.) and identify shortfalls or limiting factors that would be detrimental to achieving the mission objectives.

Base Support Planning Committee. The Base Support Planning Committee (BSPC) is a deliberate planning body at wing level whose primary responsibility is "to actively integrate the efforts of all base-level wartime planning bodies" (8:5). The group composition includes primarily groups commanders, aerial port commanders, wing staff agency chiefs, and squadron commanders. Functions that the BSPC perform include the following:

> Review other base-level plans which describe contingency or wartime requirements for possible inclusion into the BSP and to deconflict the need for competing resources.

Review wartime and contingency requirements and identify all aircraft, personnel (to include noncombatant evacuees and all services), and equipment competing for base resources.

Review all other base support planning efforts. This review should include air base operability actions, reception task force responsibilities, command and control structures, facility and utility usage, security requirements, noncombatant evacuation planning (to include Safe Haven operations), and tenant base support planning involvement. (8:5)

The BSPC is the key element of base support planning and should be the focal point in all matters concerning BSP development and maintenance.

Base Support Plan Development. Taskings for initializing BSP development originates at the Air Force major command (MAJCOM) level. Initial BSP development begins with a site survey of the location identified in the OPLAN in which the tasked unit will perform a mission during wartime, usually the lead unit. Units can be tasked to deploy to a different theater of operations under an OPLAN, to another main operating base (MOB), collocated operating base (COB) or bare base to perform its mission. A unit can also be tasked as a reception or throughput base for other forces under an OPLAN. In any event, the tasked unit will conduct a survey of a tasked location to identify all available resources that can be used during operations. Functional area experts from the tasked unit comprise a site survey team. Coordination with tenant units is essential before initiation of the site survey to determine the complete scope of the survey. Their function is to conduct data collection based on prefabricated checklists, BSP Template provided from MAJCOM/ILX, guidance from AFI 10-404, and from experience and knowledge in the field. Once the data is collected, it is compiled and

combined into a chapter format that is usually functional area specific. A BSP Part 1 is then formed with a compilation of these chapters.

The next step in the process is to produce an assessment of the missions the tasked wing and tenant units will perform during wartime operations. Resources, identified in BSP Part 1, are a list of capabilities that the deployed wing and tenants possess. An all services TPFDD, Associated Deployment Requirements Document, Annex D to OPLANs, and Annex W to MAJCOM OPLAN (WAAR) are baseline data for requirements for the assigned mission (8; 9). Resources and requirements are then compared to make an assessment of how the mission will be performed and determine what limiting factors (LIMFACs) and shortfalls may occur to impede mission completion. The completed assessments are compiled and combined into chapter format as prescribed by AFI 10-404 forming the BSP Part 2.

Upon completion, the BSP will be coordinated between wing and tenant units, as well as wing functional areas, to validate the plan as written. Corrections will be made as deemed necessary. The installation commander is the approving authority for the BSP and must sign the BSP and any subsequent actions taken regarding the content of the BSP. Copies of the BSP are then distributed to appropriate MAJCOMs and Numbered Air Forces (NAFs).

LIMFAC Reporting. An important aspect of the BSP process is the identification of LIMFACs and shortfalls. LIMFACs are defined as "personnel or material deficiencies, problems or conditions, validated by the base support planning committee, that have a critical negative impact on the ability of a unit to perform its wartime mission,

and require the aid of higher headquarters to resolve" (8:5). These limiting factors should be relevant to projected wartime or contingency conditions when the assessments are being made. LIMFACs that can be identified include lack of facilities, critical manpower shortages, equipment or vehicle shortages, lack of host nation support, etc. The key is that these shortages will seriously impede mission performance and must be corrected with the help of higher headquarters. LIMFAC reports are drafted quarterly at wing level and sent to the applicable Numbered Air Force Logistics Plans Office (NAF/LGX). After reviewing the reports, the NAF/LGX forward these reports to the MAJCOM Logistic Plans Office where the LIMFACs are addressed. The LIMFACs are broken out to the appropriate functional managers for action. MAJCOM functional managers work with the wing reporting the LIMFAC as required and keep a database of LIMFAC status and issue resolution. Wings submitting LIMFACs monitor their reported LIMFAC progress until resolution (8).

Base Support Plan Review. The final portion of the planning process is the plan review. The BSP should be reviewed and updated at least semiannually or whenever any major changes occur that might affect the plan. Major changes include loss or change in disposition of resources (facilities, equipment, vehicles), changes in unit tasking, whether lead unit or tenant unit, changes in the OPLAN that the BSP supports, changes in the TPFDD, etc. Some occurrences may warrant only pen and ink changes in the BSP documentation, whereas others, such as loss of resources at the deployed location, may require a reaccomplishment of the site survey and a new assessment to be made. During a review, units should note any recommended changes and comments and provide the

reception base with copies, sending the appropriate MAJCOMs and NAFs courtesy copies to keep them informed. Any changes or comments that affect mission accomplishment should be reported as LIMFACs to higher headquarters. MAJCOMs will act as an interface for any interservice communications.

> Specific benefits realized through the crossfeed of BSP information include in-depth review and consistent development of requirements; tailored deployment packages that eliminate duplication of resources available at the beddown location; and a common core of knowledge on planned reception actions to provide a smooth and rapid integration of incoming forces. (8:9)

These plan reviews are an important part of the review process which takes place to help develop Air Force POMs. Identified shortfalls and LIMFACs can potentially result in requests for additional budgeting and possible acquisitions in the future, linking the planning process into a cycle that is constantly moving to shape and meet the requirements set forth by national strategy and policy.

Crisis Action Planning

The discussion thus far has focused on the area of deliberate planning. The deliberate planning process is a structured process which runs its course over a large period of time. Crisis action planning is planning that is required in a crisis situation when time is variable; action may be required in a number of days or in terms of weeks. A crisis is,

> an incident or situation involving a threat to the US, its territories, citizens, military forces, and possessions or vital interests that develops rapidly and creates a condition of such diplomatic, economic, political, or military importance to the US government that commitment of US military forces and resources is contemplated to achieve US national objectives. (10:II-13)

The two processes are similar in that they use the same units, manpower, and resources and are usually performed by the same people. The major difference between deliberate and contingency planning is that deliberate planning is done in anticipation of possible future events and time for planning is not an issue. Crisis planning is planning for a real event with the possibility of implementation and must be done under time constraints.

The Crisis Action Planning process (CAP) consists of six phases: (1) Situation Development, (2) Crisis Assessment, (3) COA Development, (4) COA Selection, (5) Execution Planning, and (6) Execution (Figure 2-5). Due to the nature of contingency planning, these phases are basically an outline of how planning can be done. Events may dictate a rapid response and some of the phases may be incorporated into others or skipped altogether to expedite the process to facilitate action. The following paragraphs give a brief overview of the various CAP phases.

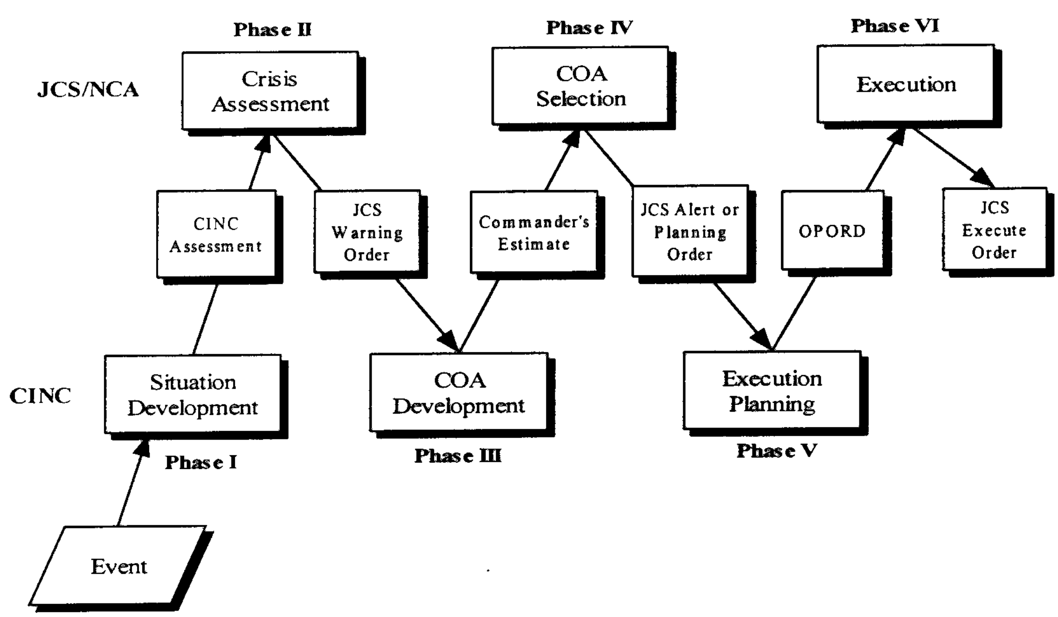

Figure 2-5. Crisis Action Procedures

Phase I – Situation Development "begins with an event having possible national security implications and ends when that event is reported to the NCA and the CJCS" (20:V-7). An event takes place in some region in the world and the Commander in Chief (CINC) of the unified command for that particular region is required to send a report the National Military Command Center (NMCC). The report contains the following key elements: "(1) information on the situation, (2) actions currently underway or proposed, (3) forces readily-available to respond to the crisis, (4) time for earliest commitment, and (5) constraint on employing forces" (4:5). The CINC may include various courses of action for consideration in his assessment.

Phase II – Crisis Assessment "begins with a report from the supported commander and ends with a decision by the National Command Authority (NCA) to return to the precrisis situation, or to have military options developed for possible consideration and possible use" (21:V-9). This stage is characterized by intelligence gathering by the JCS in order to gain insight on the situation and make an assessment on whether the situation warrants further action or a return to normal posture. A review of OPLANs concerning the region are reviewed as well as current strategy. A move to developing a Course of Action (COA) is made if it is determined by the CJCS and NCA that the situation is indeed a threat to national security.

Phase III – Course of Action Development "begins with a decision to develop possible military COAs, normally transmitted by a CJCS WARNING ORDER and ends when COAs are presented to the NCA" (21:V-10). The Warning Order instructs the CINC to develop COAs and provide a Commanders Estimate, which lists possible COAs

and contains the CINCs recommended course of action. The Warning Order also begins allocation of forces and airlift that will be needed for a possible military response. The Warning Order also determines the possible objectives, anticipated mission or tasks, possible constraints, and develops command relationships. The key principle is that maximum flexibility is left to the Supported CINC (4).

Phase IV – Course of Action Selection "begins when COAs are presented to the NCA and ends when a COA is selected" (21:V-12). The CJCS reviews the Commander's Estimate and prepares to advise the NCA on the situation and present possible COAs. A Planning Order is issued from the CJCS to the supported CINC to direct the initiation of execution planning. This order is sent before final approval of a COA by the NCA to save time as the NCA is making its decision. Once the NCA has decided on a COA, an Alert Order is normally issued. The Alert Order is approved by the SECDEF and is sent to the supported CINC conveying the NCA approved COA.

Phase V – Execution Planning "begins when a PLANNING or ALERT Order is received and ends when decision is made to execute an OPORD" (21:V-13). The reception of the Alert Order by the supported CINC officially initiates the process of Execution Planning, although the process may have already begun under the previous reception of a Planning Order. The supported commander issues a Letter of Instruction (LOI) concerning TPFDD development. The supported commander also converts the approved COA into an OPORD which has the purpose to "provide the components, supporting commands, and agencies a detailed operation plan and task those involved to prepare for the operation" (21:V-14). The OPORD is a fact-based document which

essentially directs the execution of an operation. The supported CINC sends the proposed OPORD to the CJCS and NCA for final approval.

Supporting commanders begin to identify and task units that will support the operation in JOPES. The unit movement requirements are assessed and steps are taken to begin to develop lift scheduling. US Transportation Command (USTRANSCOM) begin feasible airlift and sealift scheduling in accordance with projected force movement provided by the supporting CINCs. The focus at this stage is to plan the initial increment of movement. The Services (Army, Navy, Marines, Air Force) begin mobilization of forces and the preparation of augmenting forces.

Phase VI – Execution "begins with the decision to execute an OPORD, normally transmitted by a CJCS Execute Order, and continues until the crisis is resolved satisfactorily" (21:V-15). The CJCS publishes the Execute Order, which reflects the NCA decision, issued by authority and direction of the SECDEF. The Execute Order orders the supported CINC to carry out his OPORD. The supported CINC executes the OPORD and uses JOPES to monitor force deployments. USTRANSCOM continues lift scheduling in accordance with the force and sustainment priorities set forth by the supported CINC. Supporting CINCs employ their assigned forces selected to achieve mission accomplishment. The supported CINC reports all shortfalls and LIMFACs to the CJCS for resolution. In the instance that the NCA decides not to progress into the Execution phase, the CJCS "will evaluate the situation and provide the (supported) CINC guidance on either continuing under CAP procedures or developing a plan to expand, reduce, or continue planning using... deliberate planning measures" (21:V-16).

Base Support Planning Perspective

Base support planning plays a role in both arenas of planning: deliberate and crisis action planning. Base support planning is the result of creating supporting plans in the deliberate planning cycle. It is an important resource which allows for planners and tasked units to realize what resources are available and how operations will be performed at the deployed location in times of war. OPLANs, as well as Base Support Plans, are useful tools in times of crisis, providing a building block for possible future regional contingencies.

The current system for building and maintaining BSPs has its limitations however. As noted earlier, the cycle which drives national strategy building and policy making which in turn begets OPLANs which in turn begets BSPs is a process which turns over every two years. BSP reviews are to take place at least semiannually for accuracy. Budgets often play a part in reducing the upkeep of BSPs due to the cost of sending site survey teams to an overseas location (12). In terms of deliberate planning, the lack of current information is acceptable. However, in a crisis this information is valuable. Its accuracy would expedite the CAP process and make assessments more precise. Units may receive a tasking, in a crisis situation, to deploy to a location other than one listed in the appropriate OPLAN. Information may be available in BSP format for that location, but there is traditionally no medium other than surface mail or courier to deliver that information to the tasked unit to provide them with an outlook as to what resources are available at that location. PACAF is trying to alleviate that problem with posting BSPs on a classified internet for easy access (12). This system, however, does not solve the

problem of changes to the assessments made in the BSP Part 2. New assessments would have to be made under these conditions. A unit tasked to a location where no information is available (no BSP available) has an even greater difficulty. In both instances, teams need to be dispatched to survey the location, report on resources and assess how the mission will be performed at the site. In a crisis situation, this can be time-consuming in an environment where time is of the essence.

Previous research has identified five critical elements involved in base support planning: (1) the accurate interpretation of source documents, particularly the TPFDD and the WAAR; (2) ensuring the total force capability is essential in BSP development, assessing the resources versus a worst case scenario of requirements; (3) planning for force integration is critical in base support planning which involves the sharing of resources (facilities, vehicles, consumables) between units; (4) having planning flexibility so that changes could be made when needed; and (5) planning for activities responsible to receive, beddown, and outload transiting or deploying forces is the final critical element (32).

Other problems are also identified in the base support planning process. One key problem that is identified is getting base agencies to fully commit to the planning process. This lack of commitment leads to a lack of training of personnel in the planning process which can later result in inadequate data collection and poorly developed or inaccurate chapters in the BSP. There is also no clear method on how data is to be collected. Many assessments are made through the personal experience of personnel who are developing

the BSP chapters. It is agreed that there is little guidance on what steps are needed to be taken in order to develop a base support plan (32).

Desert Shield/Storm provided a real look at the effectiveness of planning. OPLANs existed for the particular AOR, however assumptions made within the OPLANs were later discovered to be invalid for the specific contingency scenarios being introduced. It was noted that some of the assessments for facility feeding capability and emergency billeting capacity were overly optimistic (14). Units taskings were often handed down from higher head quarters telephonically. This is an accepted measure under Crisis Action Procedures, however, over time many of these taskings changed. TPFDD production, which would provide a hard copy of taskings, was delayed by several days and did not necessarily agree with the previous telephonic taskings (16). Reception units at deployed location were unsure as to what forces were going to populate their base, making assessments difficult (14).

Identifying incoming forces is necessary in creating assessments at the deployed location. Assessments need to be made in terms of messing, billeting, civil engineering, aircraft parking, fuels, security and transportation. The sooner the incoming force is identified, the sooner the assessments can be made and shortfalls, LIMFACs and overages could be identified. Augmenting forces can be requested to assist in beddown preparation if it is seen as necessary due to the results of the assessment. Projected overages can lead to UTC tailoring resulting in a reduction in resources requiring airlift and possibly reducing the amount of personnel arriving at the base. In some cases, Host Nation Support may be in question and make previous assumptions invalid driving new

assessments to be made (14). Rapid assessment capability would prove to be a great benefit in such situations.

Enhanced Contingency Logistics Planning and Support Environment (ECLIPSE)

An initiative was set forth to deal with some of the problems experienced in the planning arena in Desert Shield/Storm. The Armstrong Laboratory, Logistics Research Division (AL/HRG) began a research and development project, referred to as the Enhanced Contingency Logistics Planning and Support Environment (ECLIPSE) initiative, to develop solutions to these problems. "The goal of this initiative is to demonstrate how advanced technologies can improve the quality and timeliness of wing logistics planning and replanning for short notice-contingency operations" (24:i). Five types of information were identified as important in terms of logistics planning: (1) expected length and pace of operations, (2) other units that are deploying to the same location, (3) beddown location attributes, (4) maximum manpower and material that can be deployed, and (5) type and amount of airlift allocated to the unit (24). Three components comprised the initial ECLIPSE vision: (1) the Deployed Information and Support Environment (DISE), (2) the Unit Type Code Development, Tailoring, and Optimization (UTC-DTO), and (3) the Logistics Analysis to Improve Deployability (LOG-AID) (Figure 2-6). These component are to aid logistics planners in gaining and managing the five important areas of logistics planning information. The DISE is the one of the three components which directly affects the base support planning process and is of relevance in this thesis. Other tools suggested by the ECLIPSE vision for future research

is a Beddown Planning Tool (BPT) and a Capability Assessor which both potentially affect the base support planning process.

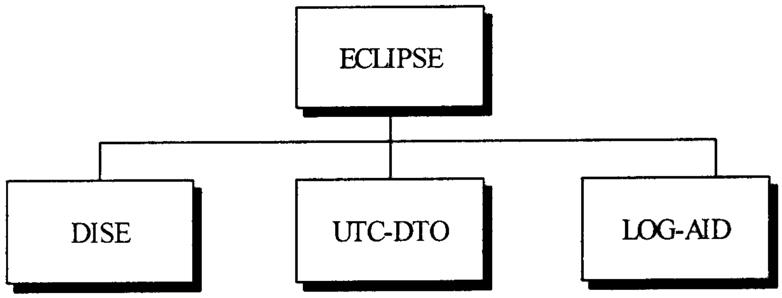

Figure 2-6. Enhanced Logistics Planning and Support Environment (ECLIPSE)

Deployment Information and Support Environment. The DISE consists of two parts: (1) the Deployment Knowledge Base (DKB) and (2) an input and user interface mechanism comprised of (a) an automatic lessons-learned recording system and (b) the Multimedia Air Field Information System (MAFIS) (Figure 2-7). The goal of the DKB is to provide wing planners with access to "near real time" information about locations that their units might deploy. The DKB is designed to be a database containing audio, visual, and textual information pertaining to various potential deployment locations. This concept goes beyond the already available Automated Airfield Information File (AAFIF) which contains information on more the 40,000 airfields worldwide, listing information including aviation fuel supplies; runway, taxiway and parking characteristics; communications capabilities, etc. The DKB can hold the same information and more, including maps, site photographs, real-time and project weather information, War Reserve Materiel (WRM) assets, host nation agreements, logistics information on units

already deployed, and transportation schedules. The DKB is conceptually accessible through satellite links and wide area networks.

DISE

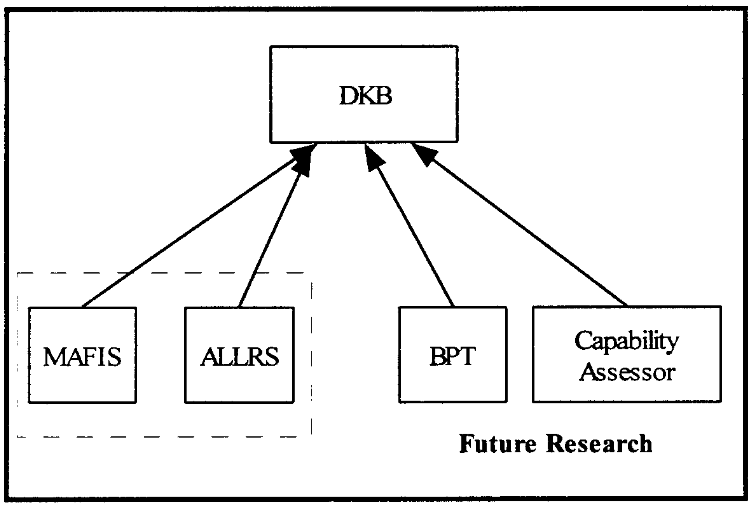

Figure 2-7. Deployment Information and Support Environment

The MAFIS will be an electronic, portable system allowing site survey team members a platform to record their observations. This format provides the input into the DKB. The idea is to get away from the "stubby pencil" method of collecting data for a site survey and providing a comprehensive, multimedia approach which can store information as it is being collected and later transmit via satellite, land line, wide area network, or any other medium to the DKB. The MAFIS is not only a tool for initial survey, but can also be useful in time-critical situations, deploy with a unit and transmitting updated information about a location to home station.

The Automated Lessons Learned Recording System (ALLRS) is the second component of the DISE. "ALLRS will provide for the collection of quantitative data

involving problems experienced during an in-theater tour, and the recording of user-specified problems and solutions" (24:19). This capability allows for the recording of problems and solutions during the deployment as they happen, and does not rely on after action reporting, inputs into the Joint Universal Lessons Learned System (JULLS) or, in some cases, the information is not recorded at all. These tools are to provide logistics planners with improved methods of planning and provide more accurate planning data.

Beddown Planning Tool. The Beddown Planning Tool (BPT) is a concept for future research under the initial ECLIPSE vision. The BPT is to provide the capability to create in-depth plans for a potential deployed location. The BPT uses a graphical interface which can provide spatial relationship comparisons of particular entities on a graphical layout representation of the deployed location. Tent cities, aircraft, fuel bladders and the like can be placed on the map overlay to show where these entities would occupy space at the location and give planners an idea as to how to place objects and how much room is available.

Capability Assessor. The Capability Assessor is a tool which will simulate unit flying operations using information gathered from resources provided by UTCs and known assets at the deployed location. Scenario database dealing with aircraft mission, types, sorties rates, attrition rates and maintenance procedures would be added as an input. The simulation would result in determining whether UTCs can be tailored, or simply, if excess equipment would exist that can be left behind at home station and free up space for airlift. Simulations could also be done to validate medical, messing, housing, and resupply operations to determine what is needed to perform the mission (24).

Logisticians' Contingency Assessment Tool (LOGCAT)

The ECLIPSE initiative transformed over time into another research and development initiative of the Armstrong Laboratory/Logistics Research Division (AL/HRG). The Logisticians' Contingency Assessment Tool (LOGCAT) is a program that has the goal of applying "advanced technologies to improve the quality and timeliness of wing logistics planning and replanning for short notice contingencies" (30:3). The LOGCAT program consists of three components: (1) the Survey Tool for Employment Planning (STEP), (2) the Beddown Capability Assessment Tool (BCAT), and (3) the Unit Type Code - Development and Tailoring (UTC-DT) (Figure 2-8). STEP and BCAT directly concern the base support planning process and are the focus of this thesis.

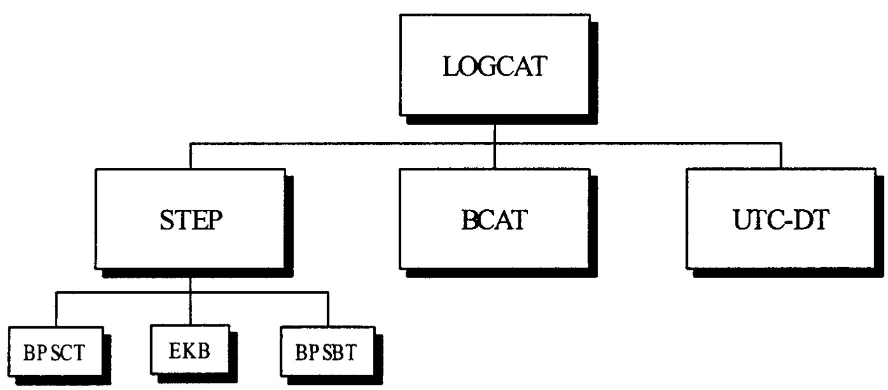

Figure 2-8. Logisticians' Contingency Assessment Tool (LOGCAT)

Survey Tool for Employment Planning (STEP). The Survey Tool for Employment Planning is similar to the DISE under the ECLIPSE vision. STEP is to provide a multimedia approach to data collection in the site survey process and to provide

a centralized database for functional area planners to quickly access data pertaining to possible deployment sites and to support the BSP development process. STEP consists of three components: (1) the Base Support Plan Collection Tool (BSPCT), (2) the Employment Knowledge Base (EKB), and (3) the Base Support Plan Browsing Tool (BSPBT).

The BSPCT is similar to the MAFIS component of the DISE. The BSPCT uses a graphical user interface as a data collection tool for site surveys. It has multimedia capabilities that allow audio/video clips, photos, mapping information and text to be imported.

The EKB is similar to the DKB component in DISE. The EKB is an information database containing the multimedia site survey data and textual information that was collected by the BSPCT. The database will contain other information to include geographical and region-specific information and is to be set up on a client/server system to allow for rapid and easy access to logistics planner and other functional area planners. The BSPBT is the graphical user interface which will allow logistics planners and other functional area planners to access the data contained in the EKB.

Beddown Capability Assessment Tool (BCAT). The Beddown Capability Assessment Tool is similar to the BPT mentioned as an area for future research in the ECLIPSE vision. "BCAT provides a time-phased comparison of weapon system operational and logistical requirements relative to base-level capabilities. BCAT is an expert system that assesses the warfighting capability of operational forces (30:4). BCAT uses information collected by STEP, available resources at a deployed location, and is

compared with other inputs determining requirements for mission accomplishment such as air sortie generation and force beddown requirements portrayed in the mission profile and TPFDD. BCAT will be able to perform an assessment of capabilities versus requirements and both graphically and textually display its results. LIMFAC determinations and shortfalls are easily determined through the use of a built-in drill-down application. Resource overages can also be reported which can be useful in UTC tailoring, shoring up space on airlift and reducing the deployment footprint.

Summary

Planning is a measure taken to counter possible threats to national security and interests. It is a well-defined national strategy, driven through an interlocking network of systems, that gives direction to joint operational planners to build operational plans. The resulting OPLANs describe actions, in broad and strategic terms, to be taken in the event of threats to national security and interests across the globe. Supporting plans are written in support of individual OPLANs to provide greater detail in how operations and missions will be performed in the event that an OPLAN is executed. Base Support Plans are one type of supporting plan. The purpose of Base Support Plans are to identify available resources at a given location and match these resources against the requirements of the units tasked at this location to perform their given mission. Assessments are made in regards to this matching of resources versus requirements, identifying shortfall and limiting factors which may impede the mission from being accomplished.

Base Support Plans are useful elements in Crisis Action Planning. Accurate and current Base Support Plans can deliver information about a locale in which a crisis might occur. Crisis Action Planning is planning done in a crisis situation where time may not permit all actions taken in deliberate planning to be accomplished.

Previous research identifies five critical elements in the development of Base Support Plans: (1) the accurate interpretation of source documents; (2) ensuring total force capability; (3) planning for force integration; (4) planning flexibility; and (5) planning for activities responsible to receive, beddown, and outload transiting or deploying forces. Other elements were identified as problems in the BSP process which included lack of training and guidance. Desert Shield/Storm provides several examples of weaknesses in the planning process.

In light of some of these problems, several initiative were set forth to improve the process. The foundation is built on the ECPLISE vision which developed a series of software applications to be used for the collection and storage of data from site surveys performed in the BSP process, as well a lessons learned database. LOGCAT was conceived from this vision and incorporated under the LOGAID umbrella. STEP is an improvement to the data collection tool and database system and BCAT, a software package that can perform assessments, was developed from a previous idea, Beddown Planning Tool, under the ECLIPSE vision. These tools are foreseen to enhance the base support planning process by providing fast, accurate, and standard means of collecting and using base support planning data.

III. Methodology

Introduction

One of the purposes of this research is to define the current BSP development process to be used as a baseline document for training and education of logistics plans personnel and focusing BSP process improvement efforts. Another purpose of this research is to use the baseline BSP process definition to evaluate two process improvement initiatives: STEP and BCAT.

This chapter will discuss the methodology chosen to fulfill the objectives set forth in Chapter I. These objectives were stated in four phases. A major part of this research is the first phase which is the exploration of the BSP development process and subsequent mapping of that process. The next phase explores the application of STEP and BCAT in the process defined in phase 1. The third phase details how the PERT methodology will be used to build a spreadsheet model of the BSP process map for evaluation of STEP and BCAT. Finally, using the PERT spreadsheet model built in phase 3, the time differences will be computed.

Research Design

This research will be conducted in four phases incorporating qualitative techniques and PERT. The objectives of each phase will be met before shifting to each subsequent phase. The "as is" and "to be" BSP development processes will be defined by conducting extensive literature reviews and consultations with BSP experts throughout

the Air Force. The consultations will be iterative to ensure consensus among the experts. The selection of the PERT methodology, discussed below, was based on (1) its merits as a project management technique using probabilistic time estimates and (2) the available techniques to reduce the impact of the PERT methodological limitations, also discussed below. Details on the specific PERT methodology are not the main focus of this research, but are included for reference in Appendix B.

The BSP development process can be viewed as a project, and the logistic plans officer as the project manager. A project is an interrelated set of activities that has a definite starting and ending point and that results in a unique product or service (23). The BSP development process has a definite starting point when the process is initiated and ends when the BSP is published and distributed. Throughout the process, there are many activities which must be performed in order to complete the project, and many activities are interdependent. These ideas prompted a hard look at the methods of PERT.

PERT Advantages. The advantages of the traditional PERT principles drove its selection as the method of analysis for this research. One advantage is "the kind of planning required to create a major network. Network development and critical path analysis reveal interdependencies and problem areas that are neither obvious nor well defined by other planning methods" (22:602) and identifies the data that needs to be gathered. The activities and interdependencies of the BSP process must be well defined in order to gather standardized data. Another advantage of PERT is "that one can determine the probability of meeting specified deadlines by development of alternative plans" (22:602). This is a good measure for decision makers to use when evaluating one

BSP method over another. "A third advantage is the ability to evaluate the effect of changes in the program" (22:603) such as shifting resources or adjusting times. Shifting resources such as personnel and equipment is not a focus of this research, however this research will adjust times to compare with and without STEP and BCAT scenarios. The last advantage for this research is the ability to present a large amount of data in a well-organized format for the BSP process owners (22). With the presentation of the BSP process in this straight-forward manner, planners can make better decisions concerning the development of the plan.

PERT Limitations. The limitations of the basic PERT assumptions have caused many managers to question its usefulness as a management tool. One limitation is "based on the assumption that project activities have clear beginning and ending points, that they are independent of each other, and that the activity sequence relationships can be specified in a network diagram" (23:815). In reality, some of the activities in the BSP process may not have a clear start or stop time. Often parallel activities are dependent on each other because of shared resources such as planners. Another limitation is "that managers should focus only on the activities along the critical path" (23:815). The BSP process could have a non-critical path that emerges as critical due to wide variability in activity times. A third limitation is the assumption that all the resources are available for the duration of the activity (23). In reality, base support planning is just one of the logistics planner's many duties.

Finally, one of the most criticized assumptions is "that uncertain activity times follow the Beta distribution" (23:815). The mean and variance formulas used in the

traditional PERT methodology are only approximations and could identify incorrect critical paths. The estimation technique, expert judgment, for activity times is a challenge to perform accurately. Lastly, the Beta distribution cannot accurately represent all activity probability distributions (23). In the early days of PERT, the assumption of the Beta distributed activities coupled with the approximations of the mean and variance was developed to provide managers with a practical management tool since calculations were typically performed by hand. Since PERT's infancy, computing power and software applications have improved exponentially making the use of more appropriate probability distributions practical.

PERT Selection. Previously, some advantages and limitations of the PERT methodology were discussed. The advantages of PERT prompted further investigation as to its merits in a research design. Literature has highlighted two of the limitations as the primary criticisms of PERT: the focus on the critical path for analysis and the uncertain activity times approximated by the Beta distribution (13). The selection of PERT was based on the ability to minimize the impact of the limitations on this research's analyses.

Early in the exploration stages of this research it became obvious to the authors that the BSP development process was not standardized. The number of methods to complete a BSP could easily be the sum of the number of organizations developing BSPs. This variability in methods is due to the low level of training of logistics plans officers, the "what," not "how to," nature of the AFI 10-404, *Base Support Planning*, and the different missions and sizes of installations. Fortunately, AF/ILXX and AL/HRG are interested in a general mapping of the proper processes that encompasses all possible

scenarios--according to the experts. This request makes it convenient for building a general map based on reviewing available both published and unpublished documents as well as consulting BSP experts across the Air Force.

Although this BSP process definition will greatly aid in the training of logistics plans personnel by illustrating the steps to develop a BSP, a general BSP model poses difficulties in data collection and drawing conclusions about populations such as time to complete a BSP. Across MAJCOMs the processes are slightly different--not wrong--just different. For example, most overseas installations require a BSP Part 2 to be accomplished, however many stateside installations do not. This example can be taken further by grouping overseas installations as main operating bases (MOBs), collocated operating bases (COBs), and bare bases (BBs). The difficulty lies in ensuring the data collected is representative of the population which conclusions are drawn about. The above example illustrates a basic statistical problem:

> Statistics deals not only with the organization and analysis of data once it has been collected but also with the development of techniques for collecting the data. If data is not properly collected, an investigator may not be able to answer the questions under consideration with a reasonable degree of confidence. One common problem is that the target population--the one about which conclusions are to be drawn--may be different from the population actually sampled. (11:4)

Once the target population is properly defined (e.g., main operating bases in PACAF that support large aircraft), data can be collected. Unfortunately, since the BSP development process has not been previously defined and subsequently performed and measured by the process owners, historical data is not available. Additionally, there are not enough BSPs produced for any particular target population in the time frame of this

research to provide data that is adequate for empirical analysis. Therefore, the data gathered for this analysis will come from consulting functional experts experienced in the process to obtain estimates. These estimates form the basis for the Triangular probability distribution (3; 29) and an approximation of the mean and variance of the Beta distribution (3; 13; 22; 23; 29). Appropriately, this estimation technique fits conveniently with the PERT principles.

Another limitation of PERT is the focus on the critical path for analysis and control. Often one or more alternate paths exist that are near critical and have higher variability. Near critical paths can easily become critical. By focusing on the original critical path, this research can fail to account for variability in the BSP process. To overcome this limitation, literature suggests the use of Monte Carlo simulation (13).

Research Questions

The research questions are restated now to provide focus for the remaining discussion:

1. What is the "as is" (current) BSP process?
2. What is the "to be" BSP process which incorporates STEP and BCAT?
3. What sub-processes are STEP and/or BCAT supposed to replace, duplicate or enhance?
4. What are the time differences between the "as is" and " to be" BSP processes?

Implementation of Research Design

Phase 1 - Development of the Base Support Plan Process Flowchart. The objective of Phase 1 is to create a comprehensive definition of the BSP process that is applicable to all BSP development scenarios. Any potential BSP process would be a subset of this comprehensive process. This phase answers research question 1.

The development of the BSP process map consisted of a comprehensive review of literature to include Air Force and MAJCOM Instructions, previous research, technical training manuals, study guides, and journal articles pertaining to the subject. Experienced personnel who have been involved with base support planning or site surveys at any level, MAJCOM, NAF, or base level, were consulted to uncover unpublished experiential knowledge. The consultations with these functional experts were iterative in nature and consisted of periodic discussions using face-to-face meetings, electronic mail, telephone, and the United States Postal Service. The purpose of repeated discussions were twofold: to solicit feedback and to build consensus. Information gained from these resources were combined to map out the BSP process flow chart.

Phase 2 - Insert STEP and BCAT into the BSP Process Flowchart. The objective of Phase 2 is to define where in the BSP development process is the planned insertion of STEP and BCAT. This definition will enable the development of a future, "to be," model for the comparison to the current, "as is," model. This phase answers research questions 2 and 3.

In order to define the "to be" process, this phase used the same techniques as in phase 1: literature review and expert consultations. Using the BSP process flowchart

defined in Phase 1 as a guide, the literature produced to date on the STEP and BCAT research and development was reviewed to find those planned insertion points in the process. Next, with the "to be" annotated BSP process flowchart, STEP and BCAT contractors, The Analytical Sciences Corporation (TASC) and Synergy, respectively, as well as the AL/HRG managers of the two programs were consulted. The purpose of these consultations is two-fold: to uncover any potential changes in the BSP process due to STEP and BCAT not documented in the literature and to ensure the concepts extracted from the literature review are consistent with the experts. Once again, this phase is iterative to obtain feedback and consensus. The product of this phase was a "to be" BSP sub-process flowchart.

Phase 3 - PERT Network Model of the BSP Process. The objective of phase 3 is to develop a spreadsheet model of the processes from phases 1 and 2 to facilitate analyses. Principles of PERT will be used to model and analyze the BSP development process.

The target source for this phase of the study was Headquarters Pacific Air Forces (HQ PACAF) planners having extensive experience using the current processes described in AFI 10-404. This selection allows for a focus on a distinct population that has been rooted in the base support planning process.

The first step was to analyze the BSP process flowchart and define activities which are understandable, measurable, and general enough to apply to all possible BSP scenarios. These activities are the foundation of the PERT network diagram. Next, the order of precedence of each activity along with the activity interrelationships were

defined and placed in a network diagram using the activity-on-arc (AOA) approach (see Appendix B for discussion). The authors used the event-oriented AOA approach because it was simpler to code into Microsoft Excel. Once the BSP network diagram was set, the functional experts from PACAF or with recent PACAF BSP experience for the various activities were queried for their best estimates of the activity times. These activity times consisted of most optimistic, most pessimistic, and most likely completion times. While the estimates were being collected, the BSP development process network spreadsheet model was built in Microsoft Excel (see Appendix F for the detailed description). The Monte Carlo simulation technique was incorporated to provide the capability of using a mixture of probability distributions and to promote accuracy in the results (13; 33).

The probability distribution used to build the simulation model was the Triangular as opposed to the Beta. The Triangular distribution is recognized as an appropriate input distribution given the three parameter estimate (3; 29). The Beta distribution could not be used to generate random variables necessary for simulation based on the three estimated parameters given (see Appendix B for discussion).

The operation of the model was verified using a variety of input activity times and hand-computed using PERT principles. Once the functional expert estimates were received and analyzed, the baseline and "to be" BSP process spreadsheet models were tentatively completed by insertion of each set of activity parameters. Finally, the baseline model was examined for reasonableness by comparison to HQ PACAF estimates for BSP completion times.

Time constraints prohibited the full validation of the model. Naylor and Finger (1967) formulated a widely used three-step validation process.

1. Build a model that has face validity.
2. Validate model assumptions.
3. Compare the model input-output transformations to corresponding input-output transformations for the real system. (3:407)

Face validity was addressed by the involvement of those knowledgeable with the process in the development of the model, while the model assumptions were provided by the functional experts of the processes and assumed valid. The third step was not attempted due to the time involved to study an entire BSP development, and is therefore an area for future research.

Phase 4 - Evaluation of Models. The objective of phase 4 is to determine the time savings STEP and BCAT may provide the USAF using the model specified in phase 3. This phase will answer the final research question.

The expected time to complete the BSP was computed by the BSP process spreadsheet from phase 3 using standard PERT principles along with Monte Carlo simulation. The simulation is employed to overcome the potential impact uncertain activity times have on the process' critical path--the path used to compute the expected time to complete. The time differences between the baseline process and the application of STEP and BCAT were analyzed using the large-sample z test with unknown variances per Devore (11).

Z Test Description. The z test is used to determine if the times to complete a BSP with and without STEP and BCAT are statistically different. The samples must be

random and independent of each other (11). The significance level, α, for this test will be 0.01. Let μ_1 and μ_2 denote the true average time to completion without and with STEP and BCAT, respectively. The parameter of interest is the difference between μ_1 and μ_2 ($\mu_1 - \mu_2$). The null hypothesis is $\mu_1 - \mu_2 = 0$, no difference between scenario average times, and the alternate hypothesis is $\mu_1 - \mu_2 > 0$, the "as is" scenario has a greater average time to completion. The test statistic, z, is

$$z = \frac{\bar{x} - \bar{y} - \Delta_0}{\sqrt{\frac{s_1^2}{m} + \frac{s_2^2}{n}}} \tag{3.1}$$

where,

$\bar{x}$ = the sample average time to completion without STEP and BCAT,

$\bar{y}$ = the sample average time to completion with STEP and BCAT,

$\Delta_0 = 0$ (the hypothesized difference),

s_1 = the sample standard deviation of time to completion without STEP and BCAT,

s_2 = the sample standard deviation of time to completion with STEP and BCAT, and

m and n are the respective sample sizes.

The rejection region for the level $\alpha = 0.01$ test is $z \geq z_{0.01}$, where $z_{0.01} = 2.33$.

Software Selection

There is an abundance of project management software options in the marketplace today that can be used for this analysis, however most are very expensive. The range is from $495 for Microsoft Project to $4000 for Primavera Project Planner 2.0. Each has a variety of options and tools for performing analyses, although when dealing with uncertain activity times, some systems require add-on software. For example, Microsoft Project can address probabilistic activity times only after adding Risk+ at a cost of $395. Fortunately, Microsoft Excel, which is standard on virtually all Air Force personal computer systems, has all the tools necessary for the analyses required by this research. Due to its widespread availability, Excel is extremely affordable and allows portability of the BSP PERT process model.

Chapter Summary

This chapter discussed the methodology chosen to fulfill the four phases of objectives set forth in Chapter I. The research design was presented which described the four-phase process used to answer the research questions: the initial development of the BSP process map; how STEP and BCAT fit within that map; conversion of the BSP process map into a PERT network model; and the subsequent evaluation of the developed models. Reasoning for using the PERT methodology was discussed presenting both advantages and limitations. Finally, the software selection was described providing insight into the use of the software package to run the model. The next chapter will present the research's findings and whether the objectives were successfully met.

IV. Research Findings and Analysis

Chapter Overview

This chapter provides a synopsis of the research findings realized through implementing the phases of the research design described in Chapter III. Also, an analysis of each phase's product is provided. The research findings section is structured according to the specific phases of the research design. Phase 1 details the development of the BSP Process Flowchart, the foundation of this research study. Phase 2 describes the planned insertion of STEP and BCAT. The development of the BSP Process PERT Model is explained in Phase 3. And the time differences are computed by the BSP Process Model in Phase 4. Where appropriate, the answers are provided for each of the research questions.

Research Findings

Phase 1 - Development of the Base Support Plan Process Flowchart.

Question 1: *What is the "as is" (current) BSP process?* The first step in determining the possible benefits that tools like STEP and BCAT can bring to the base support planning process is to determine how the process is comprised. A clearly defined process map must be constructed and examined to clearly show what steps the newly introduced tools can enhance or eliminate. Although AFI 10-404 and various checklists (developed and maintained at base level and MAJCOM) explain the content and possible data collection procedures for the various chapters in the BSP, there is no comprehensive

process chart representing the actions by all units taken at the point a unit receives its tasking to produce a complete BSP. The process flowchart is built in such a manner as to be broad enough to cover what actions are to be taken in BSP production at all levels and in various scenarios. The process flowchart should show general actions that are taken at wing, MAJCOM, NAF, Air Component levels as well as have the ability to apply to any given AOR and still be able to fit a process for BSP construction for a CONUS, MOB or a COB or bare base on foreign soil.

The base support planning flow chart construction began as a product requested by Armstrong Laboratories at Wright-Patterson AFB, Ohio, our sponsor in this endeavor. Armstrong Laboratories was working closely with civilian contractors, TASC and Synergy, in the research and development of the STEP and BCAT systems. A comprehensive base support planning model would provide greater insight in how the process works and how STEP and BCAT would fit into that process and their potential impact to that process.

The initial process flow chart was conceived out of a review of AFI 10-404 and through personal experience working in a BSP planning process with CENTAF while stationed at Cannon AFB and through experience as a site survey team member for Crested Cap 95 at Fairford AB, England. This information was compiled and developed into a strawman process flow chart depicting the process from tasking reception to the production of the complete BSP.

In January 1997, the authors attended the Worldwide Base Support Planning conference that was held at CENTAF Headquarters, Shaw AFB, South Carolina.

MAJCOM/LGX (Air Force Major Command, Logistic Plans) representatives, as well as members from USAF/LGXX (Headquarters Air Force, Logistics Plans), were present at this conference. Members of Armstrong Laboratory involved with the LOGCAT program and civilian contractors, TASC and Synergy, who were developing STEP and BCAT, were also in attendance. We took this opportunity to personally conduct discussions with the MAJCOM and Air Staff representatives on the base support planning process, many of whom were at one time stationed at 7th AF responsible for producing and maintaining BSPs for the Korean peninsula. 7th AF and PACAF are considered to have greater expertise in Base Support Planning which is evident in the fact that AFI 10-404 is derived from PACAF procedures. They were given copies of the strawman process flowchart and asked to review it and provide any comments or additional information that they felt needed to be included. The information provided was compared and compiled to begin a second iteration of the process flowchart. Appendix J lists experts who participated in the development of the base support planning process flowchart.

The second incarnation of the base support planning flowchart was developed through the information gained at the BSP conference. The initial strawman process flowchart was used as a foundation and then broadened with the new information. This resulted in a comprehensive and detailed product which described any possible scenario that could arise in base support planning development (i.e., initial BSP development, updating an existing BSP, CONUS and overseas actions, etc.). The new product was constructed in a manner to show time relationships between actions performed at

different levels in the process (i.e., MAJCOM, base level, reception base). This version of the process flowchart was reviewed and revised several times in conjunction with the LOGCAT personnel at Armstrong Laboratory. Further discussions with members of the CADRE at Air University, Maxwell AFB, responsible for the Contingency War Planning Course, brought more information and detail to the process.

The intent of this project was to develop a PERT network to show how the STEP and BCAT initiatives can enhance the base support planning process. The flowchart in its state at this point was not conducive to easy transformation into a PERT network. Therefore steps were taken to identify key processes within the entire base support planning process that are similar and reference these processes into various tabs to the overall process chart. A total of nine tabs were developed and created a user friendly and programmable product (Appendix A). This version of the process flow chart was then sent to various MAJCOM/LGX (Logistics Plans) representatives for validation. Minor corrections and suggestions were identified and incorporated.

The last stage of validation of the base support planning process flowchart involved the discussion of the flowchart with another group of functional experts at the JFACC conference held at Synergy in Dayton, Ohio, 30 June –3 July 1997. Functional experts with a background in base support planning in the Pacific theater were sought out and given the current base support planning flowchart for review. Consensus was given on the format and accuracy in mapping the process.

<u>Phase 2 - Insert STEP and BCAT into the BSP Process Flowchart</u>. When the BSP Process Flowchart was finalized, the next objective was to answer research questions 2

and 3. From the beginning, the researchers reviewed literature provided by Armstrong Laboratory, TASC, and Synergy, as well as attending various meetings, seminars, conferences, and demonstrations to get a firm understanding of the potential capabilities of the tools. Now with a defined BSP process in hand, the research focused on where STEP and BCAT should be inserted into the existing process.

The flowchart was provided to the contractors and the lab for their inputs as to how they propose the tools will change the process. The experts were given time to analyze the flowchart, and the researchers developed preliminary changes based on observations over the past year's research. There is no way to know for sure how these tools will be used once in the hands of the users, however the following discussion presents the vision of the new processes.

Question 2. *What is the "to be" BSP process which incorporates STEP and BCAT?* The four most probable scenarios for the use of STEP and BCAT are as follows:

1. the BSP Part 1 is replaced by STEP, and BCAT is used for assessments,
2. the BSP Part 1 Draft is replaced by STEP, and BCAT is used for assessments,
3. the BSP Part 1 is replaced by STEP, and BCAT is not used for assessments, and
4. the BSP Part 1 Draft is replaced by STEP, and BCAT is not used for assessments.

Note: Refer to Appendix A as aid in discussion of scenarios.

The first and third scenarios presume a mindset change in the planning arena back to a one-part BSP. In this case, the format of the STEP gathered data, which resides in a central database (EKB) for access by all authorized planners, is embraced as the new standard for reference of base capabilities. No longer is it necessary to publish a "hard copy" BSP Part 1 and distribute it to the masses of planners requiring the document. The third block down in Appendix A, Tab A, essentially stays the same except for performing the site survey with STEP and transmit data to the EKB. The fourth and fifth blocks go away. It is important to state that the review process remains in some form. The sixth and seventh blocks would form a review, coordination and finalization process. Finally, distribution would be virtually instantaneous since the BSP information will remain in the EKB, however a message notifying planners of the finalization is likely.

The second and fourth scenarios presume the mindset remains the same as far as the requirement to maintain a "hard copy" BSP Part 1. Experienced planners are highly skeptical of electronic forms of planning data. It is best to have a paper document in case of communication breakdowns or power outages. In these scenarios, the process follows the same flow as scenarios 1 and 3 above until the sixth and seventh blocks. Here the EKB contents and the BSP Part 1 (same information, different medium) are reviewed, coordinated, and finalized. The rest of the STEP process remains as the current BSP Part 1 process.

For scenarios 1 and 2, the insertion of BCAT changes the process as defined in the flowchart only slightly. The second block "Identify Requirements" receives input from

the STEP EKB along with TPFDD, operations tempo, inventory data, policies, etc. The third block is where the BCAT performs its job by "Deconflicting Requirements with other Functional Areas" and identifying shortfalls. After the requirements are negotiated, the process repeats itself starting with "Identify Requirements." The iterations continue until all shortfalls are resolved or a decision is made to resolve the shortfall or limiting factor at a higher level. The scenarios without BCAT are identified to isolate STEP and BCAT for assessment purposes in the event that BCAT is not fielded. In this research's view BCAT won't be used without some kind of electronic form of BSP data input, while STEP can operate independently.

Question 3: *What sub-processes are STEP and /or BCAT supposed to replace, duplicate, or enhance?* Many replaced and duplicated sub-processes were discussed while answering Question 2, however there exist enhanced sub-processes as well as some less significant sub-processes that disappear.

First, in all STEP scenarios, the development of a site survey checklist is deleted from the process. Additionally, the site survey and data collection task remains the same time-wise, however the data collected is standardized. This tool forces the user to enter the data in a standard format, minimizing errors and guiding the less skilled planner. Another enhancement to the BSP Part 1 data is the flexibility in updating the data. The formal process of updating a BSP typically follows a year planning cycle resulting in a hard copy BSP, while the EKB can be updated as base capabilities change in and out of the planning cycle.

Enhancements offered by BCAT are time, energy, manpower, and frustration reductions through automation of the tedious task of assessing plan requirements of a base's capabilities. This process normally takes several days utilizing all functional area experts. With BCAT, the same assessments are done via computer alleviating the functional experts of that task and refocusing their efforts on resolving shortfalls. This new iterative process takes only a few hours to a few days.

Phase 3 - PERT Network Model of the BSP Process. Once the BSP Process Flowchart was completed and the alternative BSP processes determined, the activities of the PERT network could be defined. To do this, the flowchart was analyzed for groupings of tasks which were suitable for a PERT activity. First of all, the tasks must be grouped in such a way to support the assumption of independent activities. In order to estimate duration, the activities must be measurable. In other words, activities must have definite, understandable starting and stopping points. Due to PERT's non-iterative nature, any chance for "looping" of activities were dealt with by enclosing a loop into one activity. The iterations remain within the activity. The list of activities can be found in Appendix C. To understand what constitutes each activity, the activity descriptions are listed in Appendix D.

Once the activities were determined, the activity precedence relationships were established and the PERT network was constructed using the activity-on-arc (AOA) approach to network design (see Appendix B). The entire BSP process is represented in the network, therefore various sections of the network will not be used for all scenarios.

The BSP Process PERT Network can be found in Appendix C and the precedence relationships are annotated in the activity list in Appendix E.

Using the activity list, descriptions, and network, the functional experts, contractors, and lab personnel were consulted to acquire the activity duration times. Both the current BSP process and proposed alternative activity times were gathered and the Excel spreadsheet model was built. The model was built exclusively with the approximation formula for the Beta probability distribution described in Appendix B due to the nature of expert estimates. However, the Excel BSP model can be modified to incorporate other distributions provided the existence of detailed data (27). The details to build and use the model are included inside the spreadsheet, and the model in its entirety is provided in Appendix F.

Phase 4 - Evaluation of Models. With the formulation of the BSP Process PERT Model, the final phase of this research design can be accomplished. The four scenarios stated in Phase 2 along with the baseline data were inserted into the model for evaluation, and the results of the Monte Carlo simulation of 500 realizations of each BSP process are presented.

The baseline model for the initial BSP process resulted in a mean and standard deviation of BSP completion times to be 269.4 days and 29.9, respectively. Interestingly, the minimum observed time to complete a BSP was 195.5 days, while the maximum took over 1 year (369.3 days)--about 175 day span.

Question 4: *What are the time differences between the "as is" and "to be" BSP processes?* The following discussion compares each scenario to the baseline model to answer question 4.

Scenario 1 represents the use of STEP during the site survey, the EKB replacement of the published BSP Part 1, and the application of BCAT to the assessment process. Appendix F-5 displays the values for this scenario and, specifically, the changes of activities G, R, S, U, V, AR, and AS. The development and review of the site survey checklist (activity G) is eliminated with the presence of STEP. The site survey (activity R) does not change much at all, however the consolidation of data into BSP chapters (activity S) is eliminated due to STEP doing it automatically. With the EKB replacing the published BSP Part 1, the BSP draft no longer needs to be reviewed (activity U), but a notification message is the likely extent of publishing and distribution (activity V). Finally, with the application of BCAT to the assessment process along with its iterative nature, the functional area meetings (activity AR) and requirement deconfliction (activity AS) times are grouped into activity AS.

Scenario 1 was applied to the Excel model and Table 4-1 shows the results as compared to the baseline results. With scenario 1 in the Excel model for the initial BSP process, the resulting mean and standard deviation of BSP completion times are 239.1 days and 26.3, respectively. The z test described in Chapter III can now be performed on the baseline and scenario 1 samples. At an $\alpha = 0.01$ level of significance, the test statistic, z, is 17.014 (using equation 3.1). This z value is far greater than the $z_{0.01}$ value of

2.33 rejecting the null hypothesis that there is no difference between the two sample population means.

Table 4-1. Scenario 1 Comparison to the Baseline

	Time to Completion (Days)				Probability of Completion (Days)			
Scenario	**Mean**	**Std Dev**	**MIN**	**MAX**	**240**	**270**	**300**	**330**
Baseline	269.4	29.9	195.5	369.3	0.17	0.509	0.862	0.973
1	239.1	26.3	170.7	327.9	0.537	0.877	0.944	1.00

Finally, the minimum observed time to complete a BSP was 170.7 days, while the maximum observed time took 327.9 days. The numbers show a time reduction of approximately 30 days on average with the application of this scenario to the BSP process. The probability of completion by a certain day is provided and, for example, scenario 1 will be completed by the 270 day about 88 percent of the time versus only 51 percent for the current process.

Scenario 2 represents the use of STEP during the site survey, the EKB complementing the published BSP Part 1, and the application of BCAT to the assessment process. Appendix F-6 displays the values for this scenario and, specifically, the changes of activities G, R, S, AR, and AS. This scenario is essentially the same as scenario 1 except the BSP Part 1 is reviewed, published, and distributed. The contents of the EKB are still reviewed as is the BSP Part 1.

Scenario 2 was applied to the Excel model and Table 4-2 shows the results as compared to the baseline results. With scenario 2 in the Excel model for the initial BSP process, the resulting mean and standard deviation of BSP completion times are 252.4 days and 28.5, respectively. The z test can now be performed on the baseline and

scenario 2 samples. At an $\alpha = 0.01$ level of significance, the test statistic, z, is 9.203. This z value is much greater than the $z_{0.01}$ value of 2.33 rejecting the null hypothesis that there is no difference between the two sample population means.

Table 4-2. Scenario 2 Comparison to the Baseline

	Time to Completion (Days)				Probability of Completion (Days)			
Scenario	**Mean**	**Std Dev**	**MIN**	**MAX**	**240**	**270**	**300**	**330**
Baseline	269.4	29.9	195.5	369.3	0.17	0.509	0.862	0.973
2	252.4	28.5	178.7	337.2	0.372	0.729	0.942	0.996

Finally, the minimum observed time to complete a BSP was 178.7 days, while the maximum observed time took 337.2 days. The numbers show a time reduction of 17 days on average with the application of this scenario to the BSP process, though not as great a time reduction as scenario 1. Consequently, the BSP has a greater probability of completion with scenario 2 than with current process. At the average time of completion of 270 days for the current process, scenario 2 can be completed 73 percent of the time versus only 51 percent.

Scenario 3 represents the use of STEP during the site survey and the EKB replacement of the published BSP Part 1. This scenario is the same as scenario 1 however, BCAT is not used to in the assessment process. Appendix F-7 displays the values for this scenario and, specifically, the changes of activities G, R, S, U, and V.

Scenario 3 was applied to the Excel model and Table 4-3 shows the results as compared to the baseline results. With scenario 3 in the Excel model for the initial BSP process, the resulting mean and standard deviation of BSP completion times are 256.2

days and 28.8, respectively. The z test can now be performed on the baseline and scenario 3 samples. At an $\alpha = 0.01$ level of significance, the test statistic, z, is 7.110. This z value is greater than the $z_{0.01}$ value of 2.33 rejecting the null hypothesis that there is no difference between the two sample population means.

Table 4-3. Scenario 3 Comparison to the Baseline

	Time to Completion (Days)				Probability of Completion (Days)			
Scenario	**Mean**	**Std Dev**	**MIN**	**MAX**	**240**	**270**	**300**	**330**
Baseline	269.4	29.9	195.5	369.3	0.17	0.509	0.862	0.973
3	256.2	28.8	177.6	347.2	0.308	0.667	0.937	0.996

Finally, the minimum observed time to complete a BSP was 177.6 days, while the maximum observed time took 347.2 days. The numbers show a time reduction of approximately 13 days on average with the application of this scenario to the BSP process, like scenario 2, not as great a time reduction as scenario 1. Likewise, the BSP has a greater probability of completion with scenario 3 than with current process. At the average time of completion of 270 days for the current process, scenario 3 can be completed 67 percent of the time versus only 51 percent.

Scenario 4 represents the use of STEP during the site survey and the EKB complementing the published BSP Part 1. The scenario is the same as scenario 2, however BCAT is not used in the assessment process. Appendix F-8 displays the values for this scenario and, specifically, the changes of activities G, R, and S.

Scenario 4 was applied to the Excel model and Table 4-4 shows the results as compared to the baseline results. With scenario 4 in the Excel model for the initial BSP

process, the resulting mean and standard deviation of BSP completion times are 264.4 days and 27.4, respectively. The z test can now be performed on the baseline and scenario 4 samples. At an $\alpha = 0.01$ level of significance, the test statistic, z, is 2.757. This z value is greater than the $z_{0.01}$ value of 2.33 rejecting the null hypothesis that there is no difference between the two sample population means.

Table 4-4. Scenario 4 Comparison to the Baseline

	Time to Completion (Days)				**Probability of Completion (Days)**			
Scenario	**Mean**	**Std Dev**	**MIN**	**MAX**	**240**	**270**	**300**	**330**
Baseline	269.4	29.9	195.5	369.3	0.17	0.509	0.862	0.973
4	264.4	27.4	188.3	364.8	0.191	0.592	0.898	0994

Finally, the minimum observed time to complete a BSP was 188.3 days, while the maximum observed time took 364.8 days. The numbers do not show much of a time reduction at all. The variability in the process can easily absorb any time savings, however, on average, approximately three days are saved with the application of this scenario to the BSP process. At the average time of completion of 270 days for the current process, scenario 4 can be completed 59 percent of the time versus only 51 percent.

Analysis

Phase 1. The BSP Process Flowchart is a significant step toward fully understanding the long and involved process to create a base support plan. The time spent on defining this process revealed a variety of viewpoints on base support planning ranging from the optimistic to the cynical. Regardless of the attitude variation,

overwhelmingly there was a desire to put control into the process. With a firm understanding of the process by all the players, from HQ USAF to the base level planners, the planning community as a whole can proceed with improving this process. This flowchart will serve all levels of planning for standardization, measurement, and refinement of the process and as a point of reference for training planners.

Phase 2. The determination of how the software suite can fit into the current base support planning process model not only was a necessary step in order to provide the realization of time savings, but also brought forth the prospect of a change in the plan itself. The idea of the need for a published and printed BSP Part 1 begins to diminish with the capability to have access to the pertinent information through the EKB. It can be envisioned that some review can be done "online" or only portions of data be made in a hardcopy format for review. It stands to reason that a fully printed BSP Part 1 should be available in the case of a system failure or other contingency, however, in a general sense, the most accurate version will reside in the EKB.

Phase 3. The BSP Excel Model provides a method to perform "what if" analysis on BSP process improvements efforts which never existed before. Additionally, problems can be identified by planners and then quantified using the model. Sub-processes (activities) are defined and provide a foundation for measurement. Although, data gathered for this research is for the general PACAF BSP environment and should not be used for analysis in other scenarios, estimates can be gathered in much the same manner for the other scenarios. It is important to note that the processes must be standardized and understood by process owners to gather appropriate data to input into

the model. This standardization and understanding not only applies to building a baseline model, but for tracking the performance of "as is" and/or "to be" scenarios.

One of the utilities of this model is that a logistics manager can determine the probability an activity will be completed by a specified date. This probability feature demonstrates to MAJCOMs the likelihood of bases under its control to meet deadlines. Since BSP deadlines are often not met, this model can aid in developing realistic deadlines.

Phase 4. The results of the automation versus current processes did not provide any startling discoveries; all scenarios were statistically different than the current Initial BSP process at 0.01 level of significance. Predictably, given the input data, the largest improvement over the existing process is to use STEP when conducting the site survey, replace the publishing of the BSP Part 1 with the STEP EKB, and use BCAT for assessing requirements on a base's capabilities. On average, this analysis showed 27 days of effort can be redirected from base support planning to other logistical areas.

Although the process comparisons above were not major discoveries, the length of time to complete a BSP for any scenario was noted and investigated. The authors determined the variability in the estimated activity durations for the pre-BSP Part 1 preparations was a significant factor in the overall process completion time. At least for PACAF, the pre-BSP Part 1 preparation is a target for streamlining to reduce variability and, subsequently, BSP completion times.

Chapter Summary

This chapter detailed the findings realized through implementing the research design specified in Chapter III. The research findings were discussed in order of the phases to meet the objectives of this study and an analysis of each phase is provided. The importance of the BSP process flowchart to this research was discussed along with the application of STEP and BCAT to the process. Next, the construction of the Excel model was expained, and finally the resulting data for each scenario was detailed. The next chapter will present observations on STEP and BCAT and the conclusions of this research including recommendation for future research.

V. Observations and Conclusions

Chapter Overview

The investigation into the BSP development process concludes in this chapter by discussing the researcher's observations about the BSP automation initiatives and recommendations for future research. Observations on STEP and BCAT are detailed by the positives and negatives they may bring to base support planning. This chapter concludes with a summary of the research project.

Observations on Software Initiatives

Positives. The software tools, STEP and BCAT, bring standardization to a chaotic process. In a statistical sense, these tools can put some control in a widely variable process. Planners will begin to do things in generally the same manner. The use of these proposed software initiatives can provide a common ground for all planners to work on when in the base support planning process. STEP is a platform which will become familiar to all those who play a part in performing a site survey. Its common interface will generate certain questions to be answered, reducing the probability that some important questions go unanswered. It is also a system that can be recognized as the tool to use Air Force wide, unlike the many templates that are being used now. STEP can provide a general frame of reference and create an atmosphere of understanding between all those who must, at one time or another, be part of the process.

BCAT inherently has the same general positive characteristics. BCAT can provide a standardized system for performing assessments. Currently, assessment standardization does not exist today. It can, like STEP, provide a frame of reference for all who become involved in the assessment process and create a system of understanding of how the process works. Rules and guidelines can be decided upon in determining the assessments and shared throughout the Air Force.

Another benefit of STEP is the easy storage and retrieval of an electronic form of BSP data. A developed knowledge base will decrease time in the overall data collection process as well as the need for large teams which in turn will reduce costs. The use of STEP in the base support planning process will create a comprehensive database of sites in the EKB. The database acts as a source of reference for all units who may have a tasking. Instead of copies of BSP 1 and 2 being sent by mail to all the units in question, wing-level logistics planners would have the capability to access site data when needed and inquire about certain aspects without having to go through the entire plan. Secondly, the database provides multimedia possibilities which are hard to duplicate in the current process. Additionally, the upkeep of site information can be enhanced has the higher probability of currency, therefore possibly reducing the need for a massive site survey team. The team could be reduced to players who need to survey particular areas where information is sparse and then verify other site information as required.

As stated earlier, these software initiatives can provide a standardized system in which certain important aspects of the base support planning process are performed. This standardization can significantly aid logistics planners who have been asked to perform

these functions with little or no experience. STEP and BCAT have user-friendly interfaces which prompt the user with queries of certain aspects of the site survey and guide the assessment-making procedures. Although the tools are not a substitute for training, STEP and BCAT can provide a "roadmap" for an inexperienced planner to gather and assess information pertinent to the base support planning process.

The capabilities STEP and BCAT provide planners in a crisis environment are significant. These tools were developed with CAP in mind. STEP allows for a small team to survey a site for potential deployment with a system that can asks for information and can store any type of multimedia information. An important feature also is its capability to "uplink" data to the source that needs it. Collected information can be transmitted via land line or satellite communications which provides needed information quickly in a crisis. BCAT takes the STEP data and, along with other pertinent data (TPFDD, WAAR, etc.), completes a rapid assessment of the site and mission to be performed and identifies shortfalls and limiting factors. This quick assessment can expedite resolving potential problems and provide for a smoother and reliable response to a potential contingency.

Negatives. When the researchers initially became aware of what BCAT inputs consisted of, skepticism surfaced on the validity of the fast assessments being performed. BCAT assessments rely on the accuracy of input data which can be faulty at the source such as the TPFDD. As with any computer application, the output is only as good as the input. For BCAT to be entirely successful in performing assessments, several conditions have to be met. Most importantly, resource documents which are being used as input

devices need to be as accurate and realistic as possible. People in the field express concern on the use and reliability of such products in today's process. Next, realistic rules have to be set in determining the assessments. The BCAT interface allows for those rules to be defined. Knowledgeable and experienced personnel need to be the rule-makers and in the long run determine a standard set of rules for the sake of continuity.

The issue of "garbage in, garbage out" can be taken a step further by realizing there are pitfalls by treating the output of software tools as "gospel." A danger with the introduction of any software suite which "simplifies" a process is that it can be viewed as the ultimate tool for solving a problem. The potential for output taken at face value and as the only right answer is real. Users of these tools should be made aware of pitfall through training.

Finally, STEP and BCAT must not become a substitute for training. A comprehensive software suite cannot and should not be viewed as a "cure all" for what ails the planning community in terms of training. Although certain processes are automated, an understanding of what is actually being computed and how is necessary in understanding the assessment results. Without understanding the process as a whole and its subsequent parts, the possibilities of providing faulty data as an input, misinterpretation of outputs, or the inability to discern an unreasonable output increase greatly.

Recommendations for Future Research

The focus of the BSP Process Flowchart was on the deliberate planning process described in Chapter II. The BSP process under crisis action planning is less clear then the deliberate planning process this research defined. Future studies can detail how CAP affects base support planning and attempt to find the similarities and differences with deliberate planning. Since CAP extends over a much shorter time frame than deliberate planning, the reduction in time STEP and BCAT provide the planning process could be much more dramatic with CAP.

Due to the time constraints imposed by the academic schedule and the length of time required to study a reasonable sample of BSP processes, the Excel model of the BSP process is limited by the lack of testing with real-world data. Although, the model developed has been scrutinized by experts, rarely does a stochastic process such as the time to complete a site survey action follow a triangular probability distribution. This research bases its inference on the accuracy of the estimates given by the functional experts in the BSP process. In the future, empirical data should be gathered to approximate probability distributions that are more accurate representations of the BSP process. A note of caution, however: before any measurement can be made on a process, the process owners must understand (as opposed to think they understand) the process. The availability of the BSP Process Flowchart should greatly enhance this understanding.

Another caution concerning the Excel model is the large variation in the data obtained by the experts. The wide range and many levels of experience contributed to large variances in activity time estimates which were inputs to the model. If the process

defined by the BSP Process Flowchart truly represents the process and the wide process variation is valid, then a by-product of this research is the indication of other areas needing improvement. The variation in the sub-processes where STEP and BCAT can be inserted are small relative to the bureaucratic activities prior to actual data gathering and assessments—the reason the BSPs are done in the first place. Initiatives to reduce coordination and review variances would significantly reduce overall BSP process completion times.

The phrase "process improvement" has been mentioned throughout this study because STEP and BCAT are initiatives to improve the BSP process. The approach the researchers took was to understand, define, and quantify the process to facilitate future improvement efforts beyond STEP and BCAT. Standard statistical process control methods can be used in conjunction with the BSP PERT network and Excel model to monitor the "as is" process or "to be" initiatives. Giammalvo, Firman, and Dwiyani demonstrated the utility of using realized PERT times as data and applying SPC techniques to study processes and improvement initiatives (15). The idea of linking SPC and PERT times is a logical parallel to the current BSP research and may be appropriate for future studies.

To determine the time STEP and BCAT can save the Air Force and translate that time to a cost savings comparison discussed next, more work must be done. Due to the fact this research limited the scope of its data collection to the general PACAF AOR and its analysis only on the initial BSP process, future research can extend this study across MAJCOMs, type of installation (MOB, COB, or BB), and other BSP scenarios (i.e.,

updates, BSP Part 1 only, etc.). Until this is done, a realistic estimate of time and cost savings any initiative can offer the Air Force is difficult.

The initial model introduced in this research can be further used for a cost comparison with the application of STEP and BCAT in the base support planning process. In terms of current cost of the process, manpower cost figures can be applied to each activity as well as other associated costs and determine an estimated dollar amount of the production of BSP 1 and 2. To make a comparison, the same manpower figures can be applied to the "to be" model. The major difference lies in the associated costs. For a true cost comparison to be made, the future state of the availability and usage of STEP and BCAT must be determined. Costs of implementing and maintaining an EKB must be known. How many sets of software suites are to be purchased must be realized. The environment in which the EKB will be housed must be determined, either within the Global Command and Control System (GCCS) or some other type of environment. Costs associated with data transmissions must be addressed. Only with these factors and other possible associated costs will a true cost comparison be realized.

Summary

This research project was sponsored by Armstrong Laboratory to provide a detailed understanding of the base support planning process for assessing the applicability of inserting technological advances into the existing process. The researchers are confident this study produced two tools that will not only benefit the lab, but also logistics planners at all levels and the education and training communities. The

automation initiatives of STEP and BCAT are efforts aimed at improving the BSP process for the heavily tasked logistics planner. The BSP Process Flowchart provides a framework for understanding the entire process from a broad view, and helped understand how STEP and BCAT make an impact. Further improvements on the flowchart could focus on drilling down into individual tasks to define them and likewise upgrade the Excel model. Regardless, this tool is the first known effort to define the development of the base support plan and will help facilitate process improvement initiatives.

The BSP Excel Model is a tool that enabled the BSP process to be modeled on a spreadsheet for making quantitative assessments of the process. Specifically, the current BSP process was compared to potential automation scenarios to evaluate potential time savings. This spreadsheet, the first attempt at modeling the BSP process known to the researchers, followed the BSP Process Flowchart. However, when future BSP process improvements take place, or upgrades to the flowchart, this model must also be refined. Nevertheless, the BSP Process Flowchart and BSP Excel Model are offered to the logistics planning community as flexible tools to understand and quantify the complex process of base support planning.

Appendix A - Base Support Planning Process Flowchart

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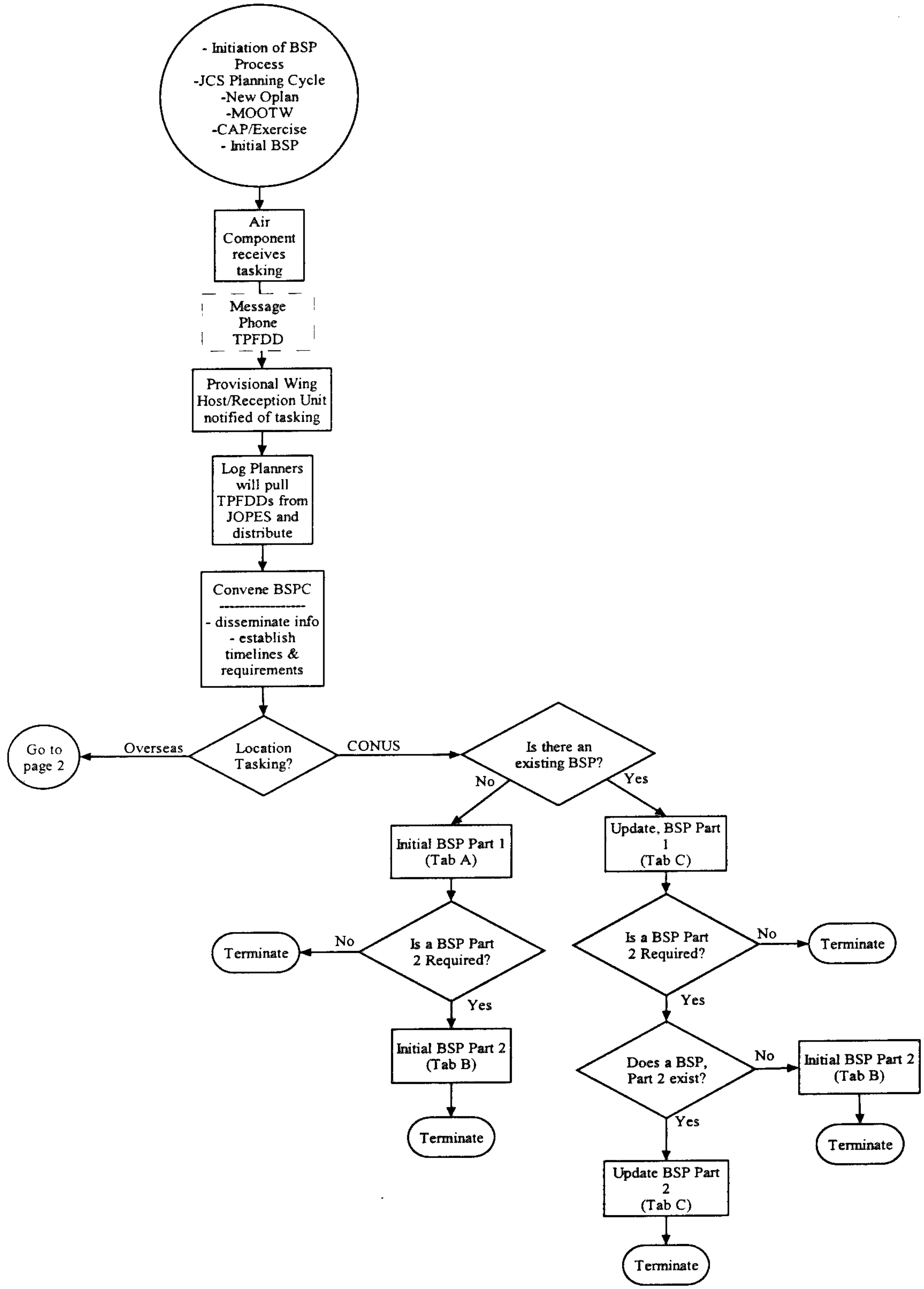
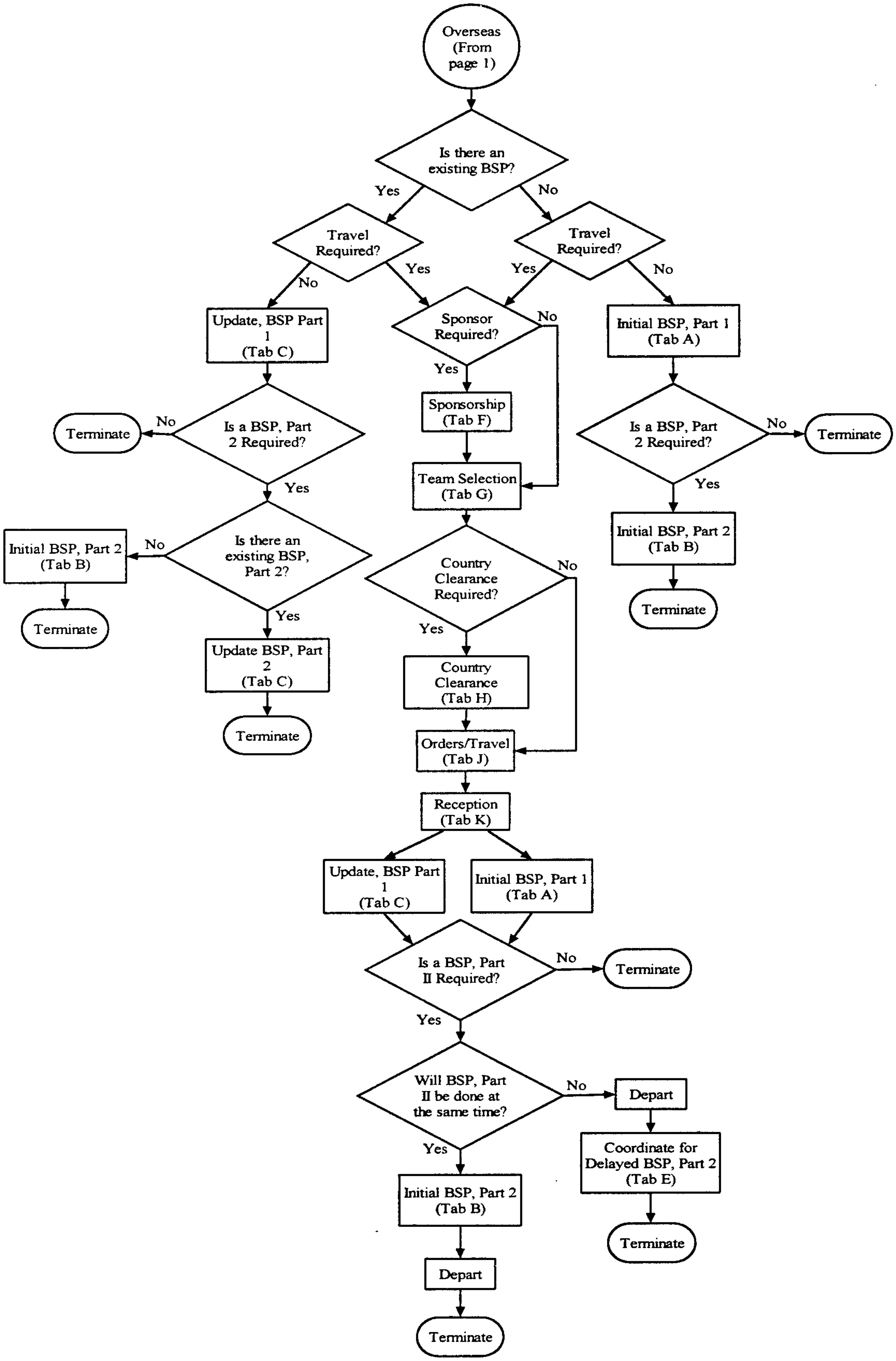
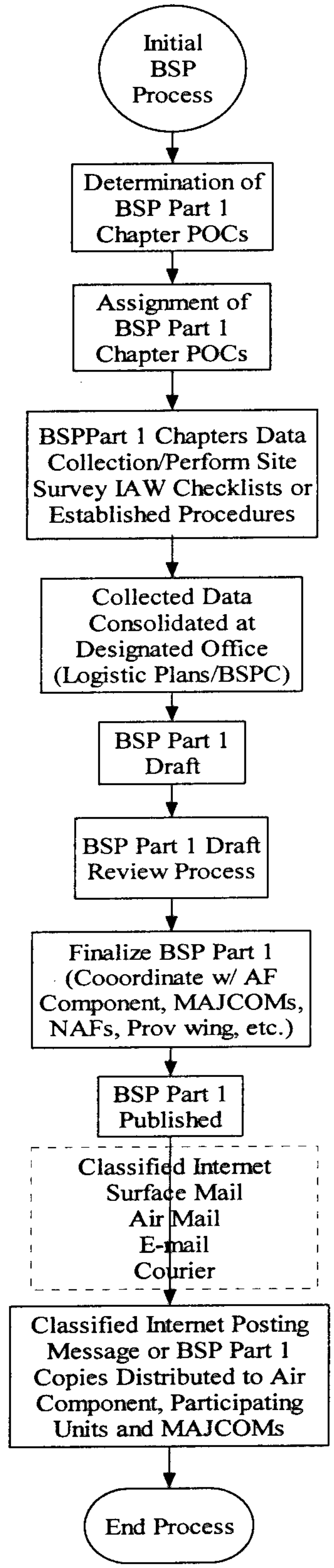
BASE SUPPORT PLANNING PROCESS FLOWCHART

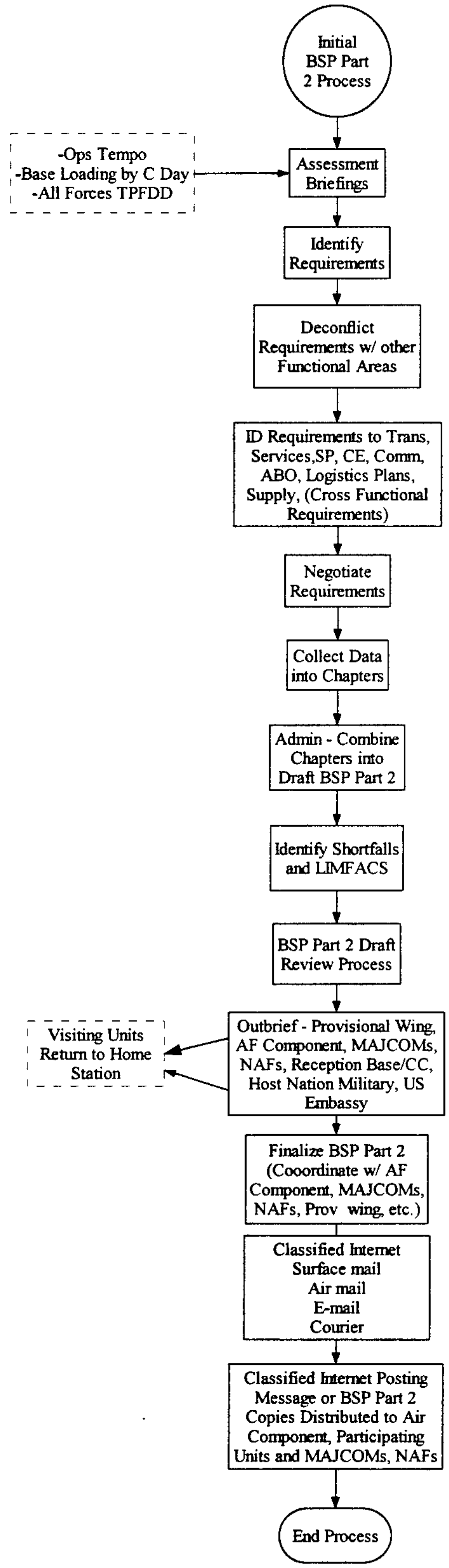



Overseas (From page 1)
Is there an existing BSP?
Yes
No
Travel Required?
Travel Required?
No
Yes
Yes
No
Update, BSP Part 1 (Tab C)
Sponsor Required?
No
Initial BSP, Part 1 (Tab A)
Yes
Sponsorship (Tab F)
Terminate
No
Is a BSP, Part 2 Required?
Is a BSP, Part 2 Required?
No
Terminate
Team Selection (Tab G)
Yes
Yes
Initial BSP, Part 2 (Tab B)
No
Is there an existing BSP, Part 2?
Country Clearance Required?
No
Initial BSP, Part 2 (Tab B)
Terminate
Terminate
Yes
Yes
Update BSP, Part 2 (Tab C)
Country Clearance (Tab H)
Terminate
Orders/Travel (Tab J)
Reception (Tab K)
Update, BSP Part 1 (Tab C)
Initial BSP, Part 1 (Tab A)
Is a BSP, Part II Required?
No
Terminate
Yes
Will BSP, Part II be done at the same time?
No
Depart
Coordinate for Delayed BSP, Part 2 (Tab E)
Yes
Initial BSP, Part 2 (Tab B)
Terminate
Depart
Terminate

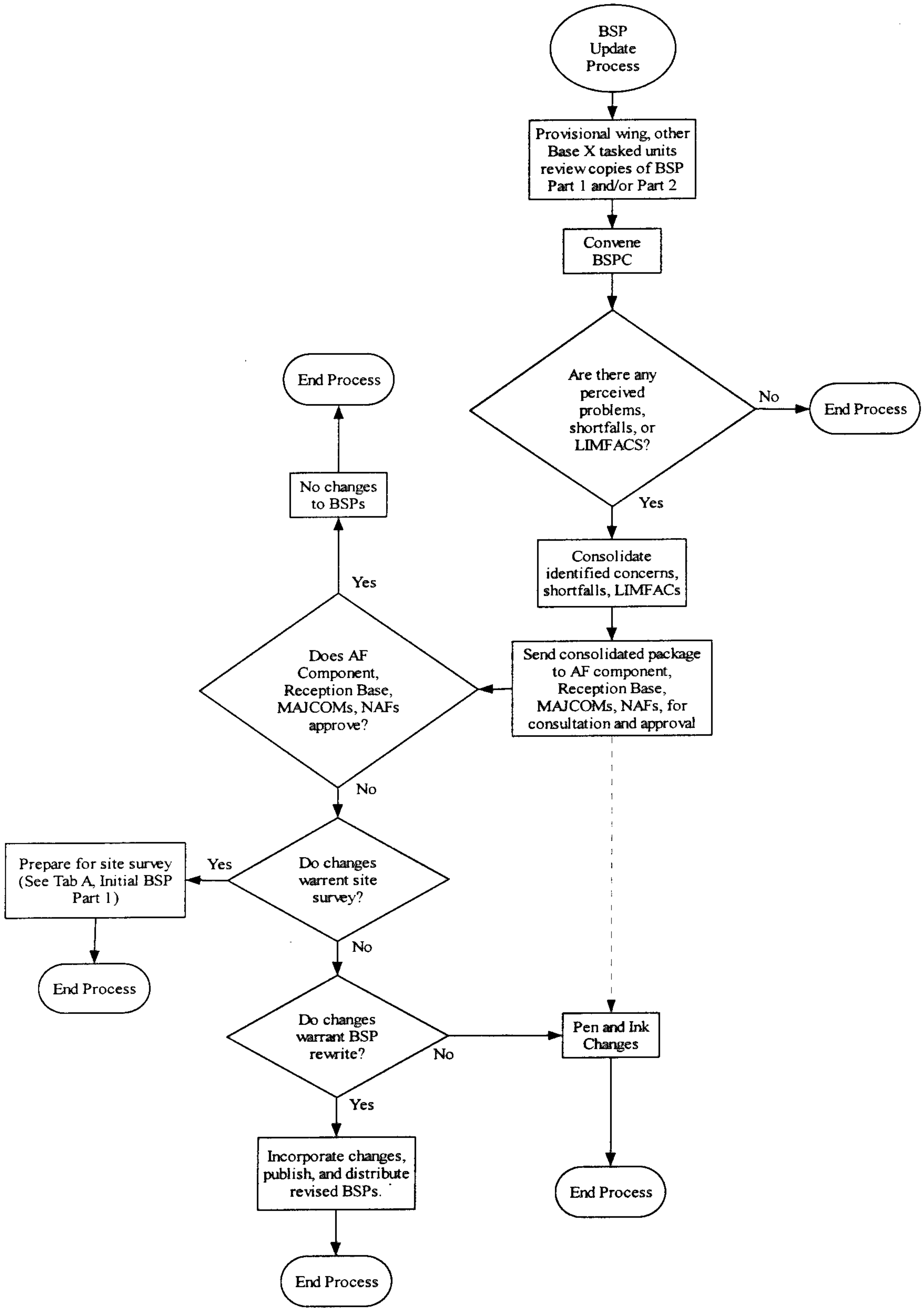
Tab A - Initial BSP Part 1



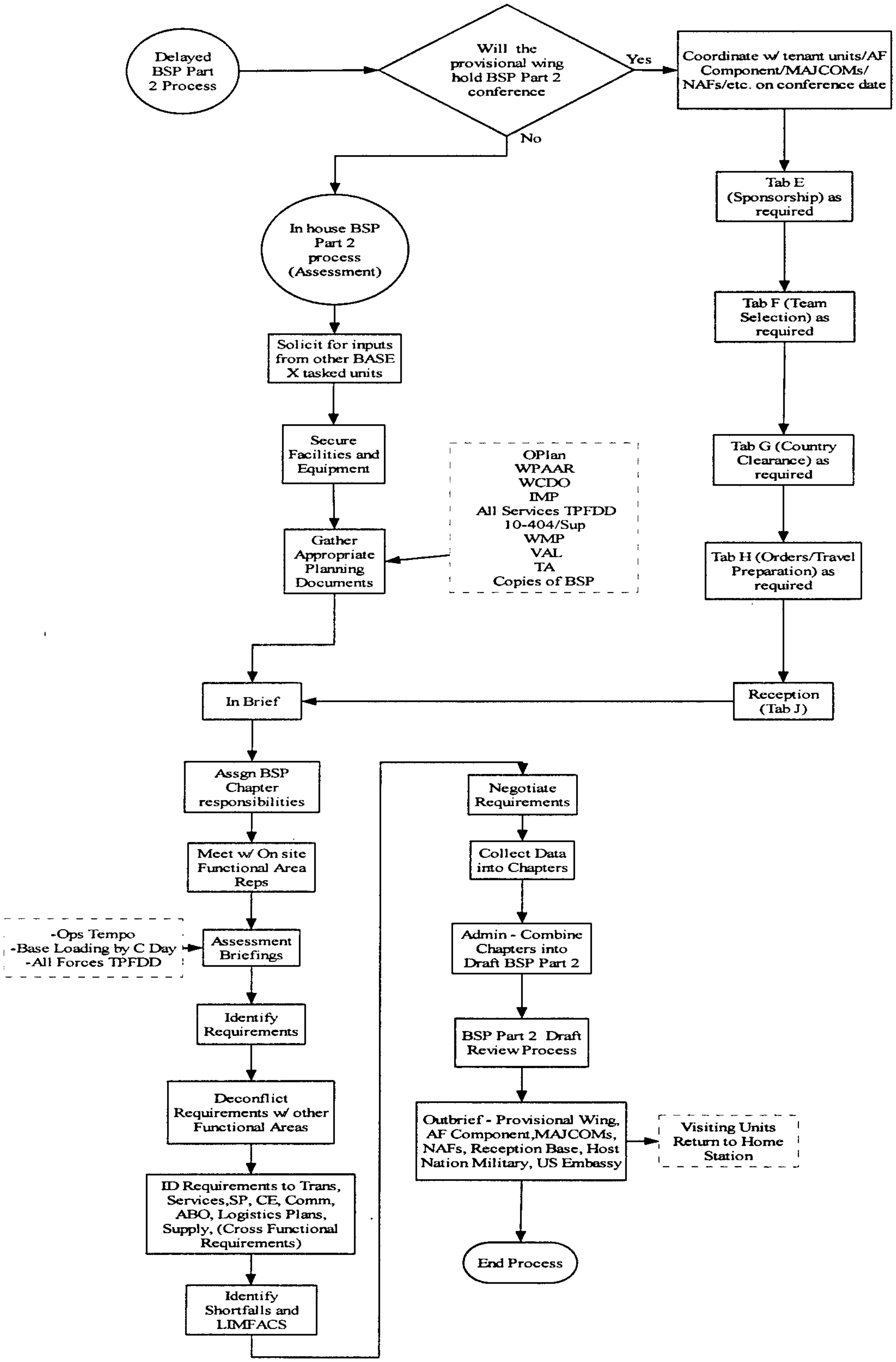
Tab B - Initial BSP Part 2



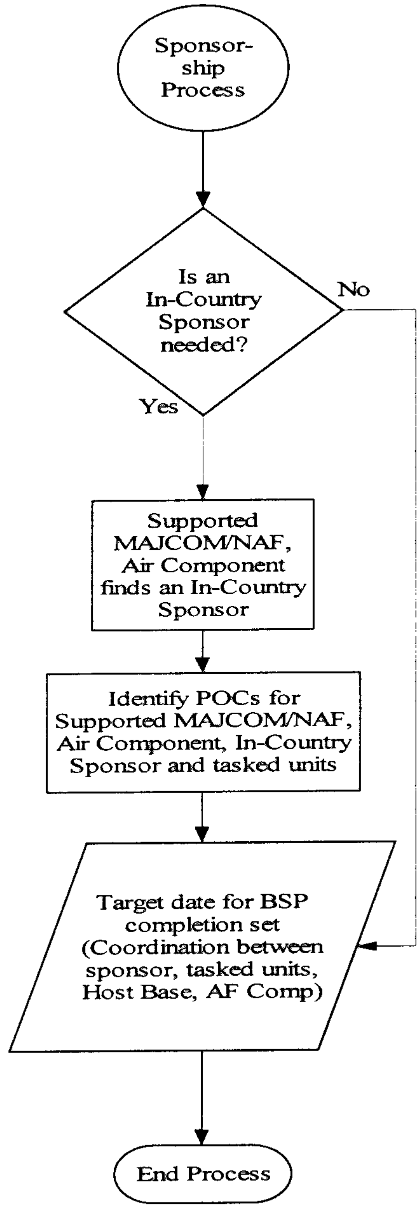
Tab C - Update BSP Part 1 and/ or Part 2



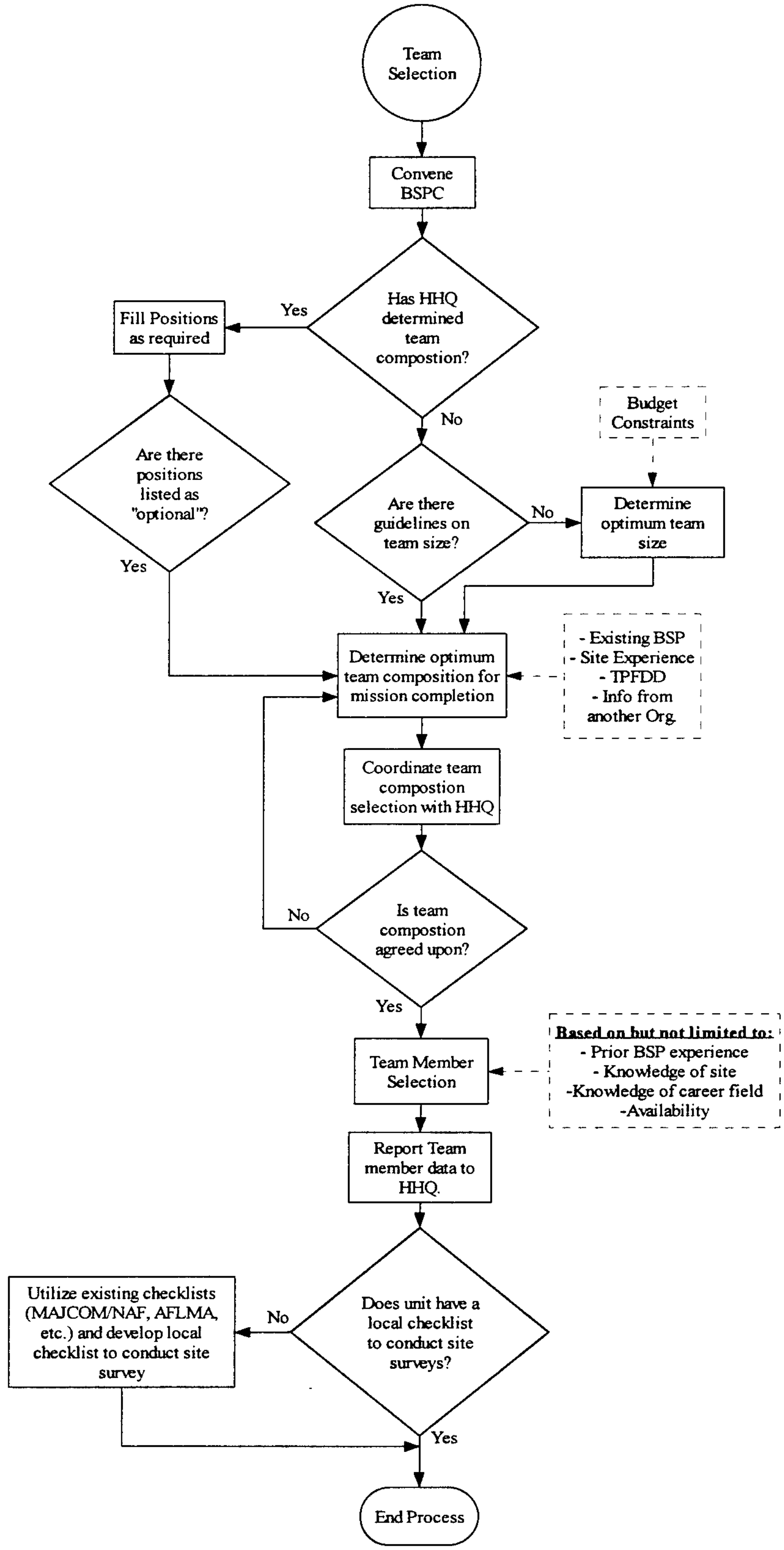
Tab D - Delayed BSP Part 2



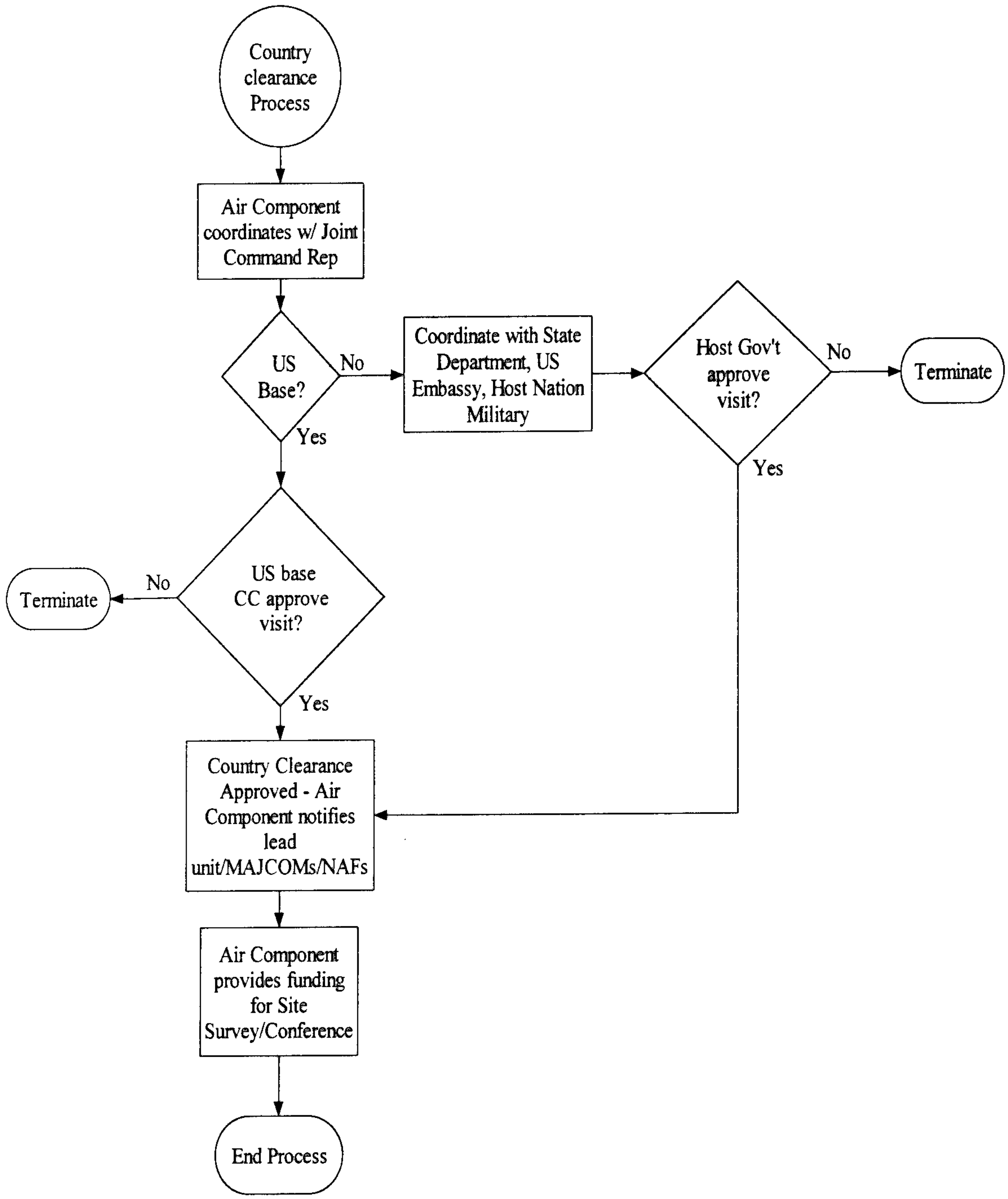
Tab E - Sponsorship Process



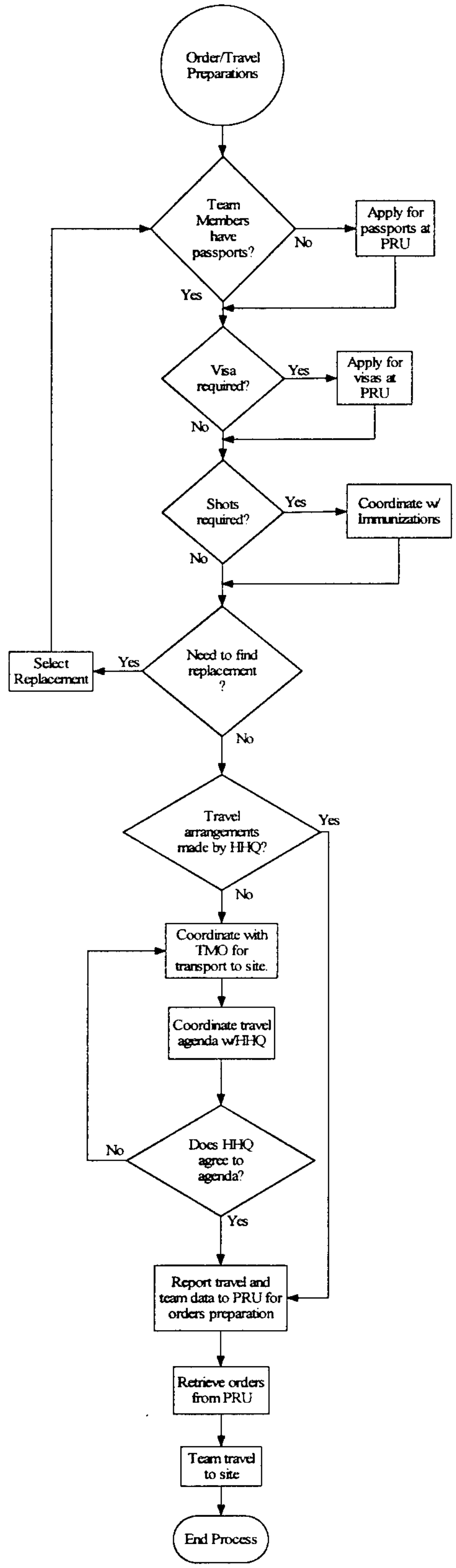
Tab F - Team Selection



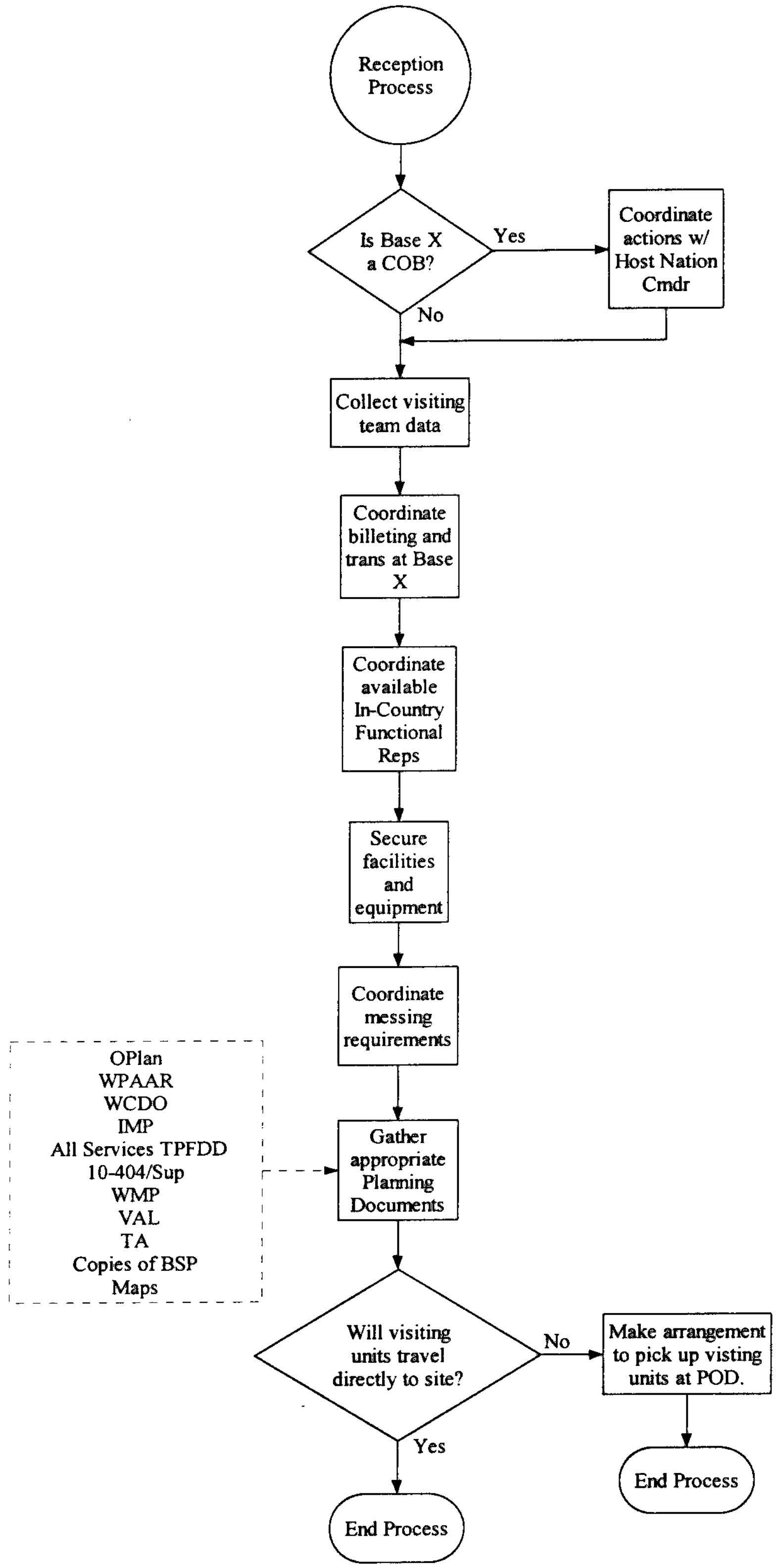
Tab G- Country Clearance Process



Tab H - Orders/Travel



Tab J - BSP Site Survey Preparation/Reception



Appendix B: Program Evaluation and Review Technique (PERT)

Introduction

A project is a "set of interrelated activities that has a definite starting and ending point and that results in a unique product or service" (23:787). To aid managers in project management, a number of network planning models have been developed. These models rely on a well thought out set of activities and their logical or technological ordering known as precedence ordering. An activity could be anything from reviewing a document to collecting data. When these activities are completed, the project is concurrently completed.

Two common examples of project planning network models are the program evaluation and review technique (PERT) and the critical path method (CPM). When the time to complete an activity is certain then managers can employ the CPM. However, activity times can be uncertain due to process variability. When this is the case, PERT is used. The methods are very similar, but mainly differ in the manipulation of the estimated times (23). Due to the high variability in the processes studied by this research, PERT is discussed here.

Network Methods

The methodological approach to PERT differs slightly from one source to another, but all tend toward these four basic steps laid out by Krajewski & Ritzman:

define the project, diagram the network, estimate time of completion, and monitor the progress of the project (23).

Define the Project. This includes the starting point and ending point and each activity in between. The proper sequence of activities are defined in precedence relationships also taking in consideration parallel and serial activities. These activities should also be to the level of detail the particular manager needs for decision-making. Additionally, the time to complete each activity is estimated in this step (23).

Diagram the Network. The two common methods that exist to create this network diagram are the activity-on-arc (AOA) and the activity-on-node (AON) methods. As the name implies, AOA (figure 1) uses arcs to represent activities. When the focus of a project is on the events, then the event-oriented AOA approach is used. A circle (node)

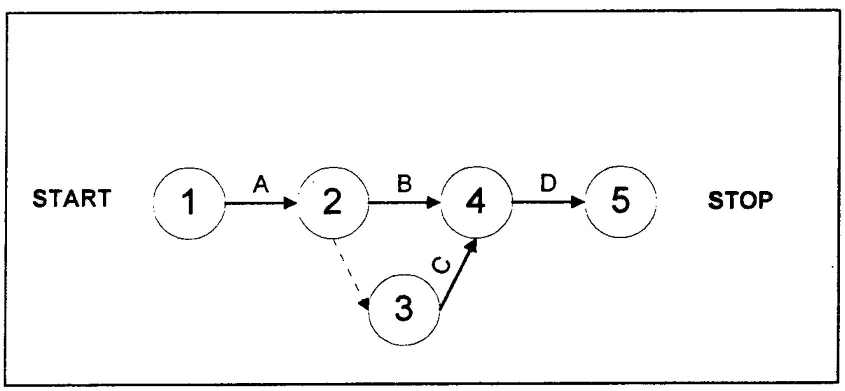


Figure B-1, AOA Network Diagram

represents an event which one or more activities end or begin. AON (figure 2) uses nodes to represent activities and arcs show the precedence relationships. When the focus of a project is on the activities, then the activity-oriented AON approach is used. Also, note

in both methods event A comes before event B, events B and C come before event D. The direction is always one way (23).

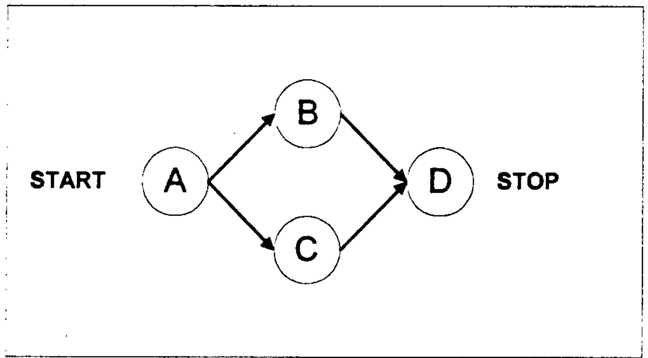


Figure B-2, AON Network Diagram

Estimate the Time of Completion. Activity times are estimated by using the functional manager's or expert's best estimate. The expert would ideally have at his disposal a good deal of historical data, the more the better. With certain activity times the manager would use CPM. But in some cases, there is no such historical record, personnel change, or the processes change. In this case, the manager would employ PERT and base the estimates on three possible completion assumptions:

- *Most optimistic completion time* - This time assumes that everything will go according to plan and with a minimal amount of difficulties.
- *Most pessimistic completion time* - This time assumes that everything will not go according to plan and that the maximum potential difficulties will develop.
- *Most likely completion time* - This is the time that, in the mind of the functional manager, would most often occur should this effort be repeated over and over. (22)

These three estimates are combined into one estimate of activity completion time. The first of the underlying assumptions that govern the traditional PERT approach is made here: the beta distribution is the probability distribution of uncertain activity completion times (13; 22; 23). The computation of the expected time between events using the three time estimates is somewhat complicated using the beta distribution. In addition to the optimistic and pessimistic time estimates, the Beta distribution is shaped by two more parameters which shape the curve. These parameters, commonly referred to by α and β or ϕ and θ, are not time estimates (11). However the founders of PERT approximated the mean and variance of activity times with the following formulas:

$$t_e = \frac{a + 4m + b}{6} \tag{B.1}$$

where,

t_e = expected time

a = most optimistic time

b = most pessimistic time

m = most likely time

and

$$\sigma_{te} = \frac{b - a}{6} \tag{B.2}$$

where σ_{te} is the standard deviation of the expected time (13; 22; 23; 29). Once the activity times are estimated, the critical path can be determined. A path in a project network is an ordered sequence of activities between the start and finish. The critical

path is the path that has the longest total time. In figures 1 and 2 above, the paths are A-B-D and A-C-D. When the times are known and summed for each path, taking precedence relationships into account, the critical path emerges as the one with the longest total time. A critical path is also the path that will cause a project delay if any activity on the path is delayed (relative to its estimated completion). For this reason, the critical path is the main focus of PERT. The second underlying assumption is that all activities not on the critical path can be ignored (13; 23). However, ignoring the non-critical activities puts the burden on the manager to watch for non-critical paths from emerging as critical once the project commences.

Since the activity times in a PERT network are probabilistic, the project completion time is probabilistic. This allows managers to determine the probability to complete the project by a particular point in time. To facilitate statistical inference, the originators of PERT specified two more underlying assumptions: project activities are independent and the number of activities on the critical path is sufficiently large to invoke the *Central Limit Theorem of Probability* to analyze the project completion time.

The assumption of independent activities allows the mean and variance of the total time of completion to be computed by the critical path time estimate and the summation of the variances of each activity in the critical path. As the number of activities on the critical path increases, the distribution of estimated total time approaches the normal distribution per the central limit theorem (CLT). The only purpose of the CLT assumption is for making statistical inferences based on the normal distribution (33).

Therefore, to determine the probability of project completion by some specified time, *T*, the z-transformation formula is used:

$$Z = \frac{T - T_E}{\sqrt{\sigma^2}} \tag{3}$$

where,

T = time of project completion (to evaluate)

T_E = earliest expected completion time (the critical path time estimate)

σ^2 = variance of expected completion time (for the critical path). (23:806)

Once the z value is computed, the probability to complete the project or a certain activity by a specified date can be obtained from a standard z-table found in any statistics text.

Monitoring the Progress of the Project. The project manager must monitor the critical path and those paths which may emerge as critical to keep the project on schedule. Computer software can aid tremendously in the management of these paths.

PERT Limitations and the Monte Carlo Simulation

To this point, the discussion on PERT principles focused on the ideal circumstance that the underlying assumptions hold. These assumptions were necessary to develop the PERT as a user friendly management tool. When the PERT assumptions are relaxed, hand calculations quickly become impractical for managers. Often a non-critical path becomes critical due to the stochastic nature of the uncertain activity times. The assumptions begin to dissolve as a result of this phenomenon. Therefore, since the

creation of PERT, the focus on the critical path has been the main criticism of the methodology (33).

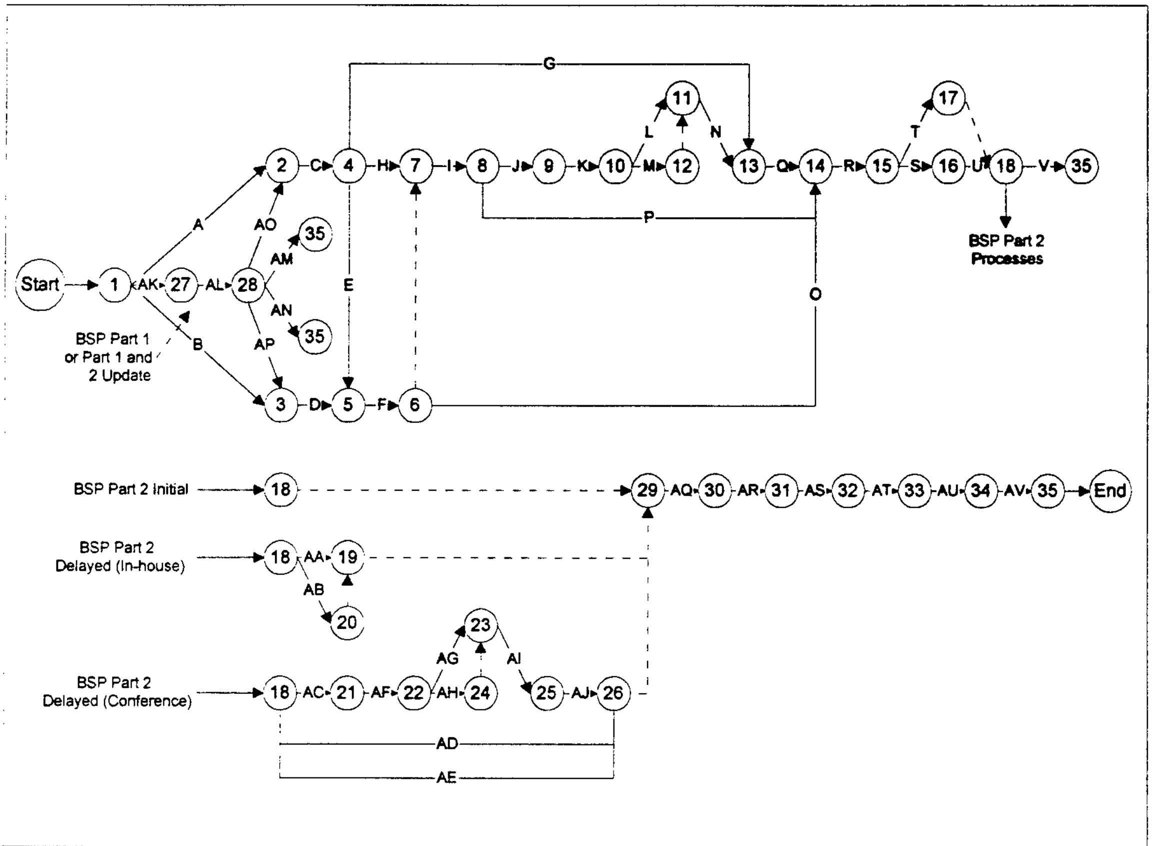
The literature addresses the non-critical path issue from a variety of approaches, but virtually all recommend the use of a computer to run a Monte Carlo simulation due to computational complexity. Van Slyke introduced the Monte Carlo method to PERT in the early 1960's and identified two benefits of the application. First, any probability distribution can be used instead of the Beta distribution. He experimented with a variety of distributions, and the differing results highlighted the weakness of assuming only one distribution. The other benefit is the computational accuracy the simulation provides. Traditional PERT always underestimated completion times--a biased estimate--when non-critical paths exist that emerge as critical. For instance, when a non-critical path emerges as critical, the new completion time would be longer than the time computed for the traditional critical path. Monte Carlo simulation provides an unbiased estimate of project completion time given accurate input probability distributions (33).

Monte Carlo simulation removes bias by simply generating a single random variable from a distribution of critical times for as many iterations desired and averages them. The critical time is the sum of the activities on that iteration's critical path. The traditional PERT method instead computes a critical path as the path with the maximum total of activity averages (17). Though practical for managers, not considering all paths for a large number of samples results in estimation bias.

Dumville (13) developed an analytic approach to the case of more than one critical path and dependent activities and verified the approach with simulation. In

addition to the two approaches, his article outlines the historical study of this phenomenon and is a great source of PERT background material.

Appendix C- BSP Process Network



Appendix D - Base Support Plan Activity Description

BASE SUPPORT PLAN PREPARATION

A. Identify and Notify Tasked Units

This activity begins when the Air Component Command or MAJCOM receive the requirement or tasking to create or revise a base support plan for a specific installation. This requirement is the initiation of the base support planning (BSP) process and comes in several forms: the Joint Chiefs of Staff (JCS) planning cycle, new operations plan (OPLAN), military operations other than war (MOOTW), contingencies, exercises, and initial BSPs. The notification can be whatever means necessary to get the message to the tasked units (e.g., message, phone, etc.). This activity ends when the provisional wing/host/reception unit are notified.

B. Air Component Finds and Notifies Sponsor

This activity begins when the Air Component Command or MAJCOM receive the requirement or tasking to create or revise a support plan for a specific installation. This requirement is the initiation of the base support planning (BSP) process and comes in several forms: the Joint Chiefs of Staff (JCS) planning cycle, new operations plan (OPLAN), military operations other than war (MOOTW), contingencies, exercises, and initial BSPs. In-country sponsors are not always required. This activity ends when the in-country sponsor is notified.

C. Units Prepare For and Hold BSPC

This activity begins upon receipt of the notification of the BSP requirement. The Logistics Plans Office at the tasked unit pulls the TPFDD from JOPES and distributes it. The Base Support Plan Committee (BSPC) is convened.

D. Sponsor Identifies and Coordinates POCs

This activity begins upon notification of the in-country sponsor, and ends when the sponsor points of contact are coordinated with the air component command.

E. Units Identify and Coordinate POCs

This activity begins at the conclusion of the BSPC. The OPR and functional areas POCs are identified and coordinated. The activity ends when the key POCs are coordinated with higher headquarters.

F. Negotiate BSP Completion Dates

This activity begins when all the key players are identified and continues through the negotiation and concurrence of the BSP Parts 1 and 2 completion dates.

G. Site Survey Checklist Development/Review

This activity begins at the conclusion of the BSPC. Units should use existing checklists (MAJCOM, AFLMA, in-house, etc.) to develop local checklist to conduct the tasked site survey. The activity concludes with an agreed upon checklist by BSP OPR, functional area planners, and BSP team members.

Note: The checklist development process is most likely iterative and may last until the BSP team departs for the site survey, but, in order to prepare properly, the required amount of time is needed.

H. Determine BSP Team Composition

This activity begins when the BSPC concludes and includes interaction with HHQ. Drivers to this process include budget constraints, an existing BSP, site experience, a TPFDD, and/or information from other organizations with experience with the site. This activity concludes when the team composition is set.

I. Selection Process of BSP Team and Coordination w/ HHQ

This activity begins when the team composition is set. The team selection takes into consideration the knowledge of the site, knowledge of the functional area, prior BSP experience, and availability to travel to the site and within the dates set. The process ends when the BSP team selection is complete and the team list is coordinated with HHQ.

J. Air Component Command Solicits Country Clearance

This activity begins when the BSP team data is reported to the air component command. The air component command coordinates country clearance request with the joint command representative. If the base is not a US base, then the host government may or may not approve the request. If the base is a US base, the base commander may or may not approve the request. In both cases, the process is iterative if the US wants to utilize the base. The activity ends with the approval of the country clearance.

K. Air Component Command Coordinates Country Clearance w/ Funding

This activity begins when the country clearance is approved. The air component command notifies the supporting MAJCOM and the tasked unit. Along with the notification, the activity ends with the funding for the TDY.

L. BSP Team Compliance with Personnel Requirements

This activity begins when the tasked unit receives notice of country clearance approval and the funds are available. The BSP team, if not previously complied with, accomplishes all personnel requirements for travel to the destination. This may include immunizations, passports, visas, etc. Please note that typically many of these requirements are considered at team selection, but some units may wait to comply until the TDY is approved and funded. Also, the possibilities of a team member dropping out is real and must be planned for. The activity ends when the entire team has met the personnel requirements.

M. Prepare Travel Arrangements and Coordinate

This activity begins when the tasked unit receives notice of country clearance approval and the funds are available. Travel arrangements may be made by HHQ such as military air coordination. If the travel arrangements aren't made by HHQ, then the BSP team makes arrangements with the appropriate travel office on base for travel to the destination site (e.g., military air, commercial air, etc.). This activity concludes when travel arrangements are made for each team member and is coordinated with HHQ, BSP team members, and the tasked unit.

N. Unit Prepares Orders

This activity begins when all the personnel requirements are met and the travel arrangements are coordinated. The personnel readiness unit prepares the TDY orders for the BSP team, and the team in turn receives the orders.

O. Reception Unit Coordinates Support for Site Survey/Conference

This activity begins when the BSP Part 1 and 2 completion dates are set. The reception unit begins the preparation for the upcoming site survey and/or BSP conference. Depending on the location, these actions may include coordination with the host nation government/commander. In-country functional area representatives must be organized for the visit. Additionally, facilities and equipment must be secured for temporary work areas, meetings, and briefings. And finally, the appropriate planning documents must be gathered and organized for the site survey/conference attendees. These documents

consist of, but are not limited to, the appropriate Oplan, TPFDD, AFIs, draft BSP, maps, WPAAR, WCDO, IMP, WMP, VAL, and TA.

Note: Typically, this process will only take as long as the time allotted based on the schedule, but, it important to know the necessary time to prepare properly.

P. Reception Unit Coordinates Support for BSP TDY Personnel

This activity begins when the BSP Part 1 and 2 completion dates are set. The reception unit begins the preparation for receiving the upcoming site survey and/or BSP conference attendees. First, the visiting team data must be gathered (i.e. MAJCOM coordination). From that information, the receiving unit can plan for billeting, transportation, and messing requirements. The transportation requirements include on-site as well as to and from the point of debarkation/embarkation. The activity is complete when the location is ready to receive the visitors.

Note: Typically, this process will only take as long as the time allotted based on the schedule, but, it important to know the necessary time to prepare properly.

Q. BSP Team Travels to Site

This activity begins when the BSP team receives their TDY orders and the site survey checklist is complete. Obviously, there may be a substantial delay between the orders pick-up and the actual home station departure due to scheduling, but, for this activity, the delay is assumed to be zero. Also, consider for this activity the typical origin of the BSP team members. This activity concludes when the team arrives at the destination and, if applicable, obtains lodging.

BASE SUPPORT PLAN PART 1

R. BSP Chapters Data Collection/Site Survey IAW Checklists

This activity begins when the BSP team is ready to begin data collection and is quite different depending on the scenario. Data collection for a home station BSP may range from tasking the base functional areas to gather data to a disciplined site survey. On the other hand, if BSP teams are traveling to a bare base, then data collection would be in the form of a site survey in accordance with a checklist or established procedures. When data collection is complete, then the activity concludes.

S. Consolidation of Data into BSP Part 1 Draft

This activity begins once the data collection is complete. The BSP team and/or functional areas transcribe the collected data into draft chapters and collectively a draft

BSP Part 1. A previous BSP Part 1 being used as a working copy receives a first draft update with the new information collected.

T. BSP Team Returns to Home Station

This activity begins when mission is complete at the site and ends once the team arrives at home station. "Mission complete" is dependent on the objectives of the specific site survey and can be at the conclusion of data collection or the completion of the draft BSP Part 1.

U. BSP Part 1 Draft Review

This activity begins once the draft BSP Part 1 is completed. The review process must include coordination with all applicable units. This process is completed when the BSP Part 1 is finalized and signed by the approval authority.

V. Publishing and Distribution

This activity begins once the BSP Part 1 is signed and includes all actions necessary to publish and distribute the BSP. Distribution can take many forms such as the U.S. Postal Service, couriers, electronic mail, or the classified Internet. If the BSP is posted on the classified Internet, be sure to transmit a message notifying those on the distribution list. This activity ends when the BSPs have been sent to all those on the distribution list.

DELAYED BASE SUPPORT PLAN PART 2 (IN-HOUSE)

This process occurs when a BSP Part 2 is required, the BSP Part 2 conference is not held with the site survey, and the provisional wing performs the BSP Part 2 assessments in-house.

AA. Solicit Inputs From Tasked Units

This activity begins after the BSP Part 1 process and the tasked units BSP teams return to home station. Inputs are solicited from the units tasked to that location to begin the BSP Part 2 process. This activity will take as long as the time allotted, so it is important to know the amount of time necessary to adequately solicit substantive inputs. This time should be built into the schedule and, therefore, the activity concludes when the tasked units have been given an adequate amount of time to provide inputs.

AB. Secure Facilities, Equipment, and Planning Documents

This activity can begin once the BSP Part 1 process is concluded and involves the logistics of preparing for the BSP Part 2 in-house meetings. Facilities and equipment

must be secured for temporary work areas, meetings, and briefings. Additionally, the appropriate planning documents must be gathered and organized for the site survey/conference attendees. These documents consist of, but are not limited to, the appropriate Oplan, TPFDD, AFIs, draft BSP, maps, WPAAR, WCDO, IMP, WMP, VAL, and TA. This activity will take as long as the time allotted, so it is important to know the amount of time necessary to properly prepare for the meetings. This time should be built into the schedule and, therefore, the activity concludes when the BSP Part 2 meetings are adequately prepared for.

Go To BSP Part 2 Core Process

DELAYED BASE SUPPORT PLAN PART 2 (CONFERENCE)

AC. Air Component Solicits Country Clearance (as required)

This activity begins when the BSP team data is reported to the air component command. The air component command coordinates country clearance request with the joint command representative. If the base is not a US base, then the host government may or may not approve the request. If the base is a US base, the base commander may or may not approve the request. In both cases, the process is iterative if the US wants to utilize the base. The activity ends with the approval of the country clearance.

AD. Reception Unit Coordinates Support for BSP Part 2 Conference

This activity begins when the BSP Part 1 process concludes. The reception unit begins the preparation for the upcoming BSP Part 2 conference. Depending on the location, these actions may include coordination with the host nation government/commander. In-country functional area representatives must be organized for the visit. Additionally, facilities and equipment must be secured for temporary work areas, meetings, and briefings. And finally, the appropriate planning documents must be gathered and organized for the site survey/conference attendees. These documents consist of, but are not limited to, the appropriate Oplan, TPFDD, AFIs, draft BSP, maps, WPAAR, WCDO, IMP, WMP, VAL, and TA.

Note: Typically, this process will only take as long as the time allotted based on the schedule, but, it important to know the necessary time to prepare properly.

AE. Reception Unit Coordinates Support for BSP TDY Personnel

This activity begins when the BSP Part 1 process concludes. The reception unit begins the preparation for receiving the upcoming BSP Part 2 conference attendees. First, the visiting team data must be gathered (i.e. MAJCOM coordination). From that information, the receiving unit can plan for billeting, transportation, and messing

requirements. The transportation requirements include on-site as well as to and from the point of deparkation/embarkation. The activity is complete when the location is ready to receive the visitors.

Note: Typically, this process will only take as long as the time allotted based on the schedule, but, it important to know the necessary time to prepare properly.

AF. Air Component Coordinates Country Clearance w/ Funding (as required)

This activity begins when the country clearance is approved. The air component command notifies the supporting MAJCOM and the tasked units. Along with the notification, the activity ends with the funding for the TDY.

AG. BSP Team Compliance with Personnel Requirements (as required)

This activity begins when the tasked unit receives notice of country clearance approval and the funds are available. The BSP team, if not previously complied with, accomplishes all personnel requirements for travel to the destination. This may include immunizations, passports, visas, etc. Please note that typically many of these requirements are considered at team selection, but some units may wait to comply until the TDY is approved and funded. Also, the possibilities of a team member dropping out is real and must be planned for. The activity ends when the entire team has met the personnel requirements.

AH. Prepare Travel Arrangements and Coordinate (as required)

This activity begins when the tasked unit receives notice of country clearance approval and the funds are available. Travel arrangements may be made by HHQ such as military air coordination. If the travel arrangements aren't made by HHQ, then the BSP team makes arrangements with the appropriate travel office on base for travel to the destination site (e.g., military air, commercial air, etc.). This activity concludes when travel arrangements are made for each team member and are coordinated with HHQ, BSP team members, and the tasked unit.

AI. Unit Prepares Orders (as required)

This activity begins when all the personnel requirements are met and the travel arrangements are coordinated. The unit prepares the TDY orders for the BSP team, and the team in turn receives the orders.

AJ. BSP Team Travels to Site

This activity begins when the BSP team receives their TDY orders. Obviously, there may be a substantial delay between the orders pick-up and the actual home station departure due to scheduling, but, for this activity, the delay is assumed to be zero. Also, consider for this activity the typical origin (location) of the BSP team members. This activity concludes when the team arrives at the destination and obtains lodging.

Go To BSP Part 2 Core Process

UPDATE BASE SUPPORT PLAN PART 1 OR PART 1 AND 2

These activities are the initiation of the base support planning (BSP) update process and could result from significant changes in the base's support posture or the periodic update of the TPFDD. Activities AM through AP are dependent on the severity of the changes approved in activity AL. Either AM, AN, or AO and AP will take place if the update process takes place.

AK. Notify Units of Update Requirement

This activity begins when the Air Component Command or MAJCOM receive the requirement or tasking that would require a specific installation to update its base support plan. The notification can be whatever means necessary to get the message to the tasked units (message, phone, etc.). This activity ends when the provisional wing/host/reception unit are notified.

AL. Tasked Units Review BSP Part 1 or Part 1 and 2, Convene BSPC, and Consolidate Identified Concerns, Shortfalls, LIMFACs

This activity begins when the appropriate units are notified of the update requirement. Upon receipt of the updated planning data the BSPC will convene and disseminate information and establish timelines and requirements. The BSP Part 1 or Parts 1 and 2 as well as any updated planning documents are reviewed for any perceived problems, shortfalls, or LIMFACs. A consolidated package is sent to the Air Component Command, reception wing, and MAJCOM for consultation and approval.

EITHER,

AM. No Changes or Pen and Ink Changes Required

This activity begins when the approved changes are identified and ends when the changes are complied with and the annual review date is set.

AN. Rewrite Required (Incorporate Changes, Publish and Distribute Revised BSP)

This activity begins when the approved changes are identified and ends when the BSP is distributed and the annual review date is set. A rewrite takes place if the changes warrant a rewrite as opposed to pen and ink changes.

AO. New Site Survey Required (Notify Units of BSP Revision Requirement)

This activity begins when the changes warrant the completion of a new site survey. This activity ends when the provisional wing/host/reception unit are notified of the requirement.

AP. New Site Survey Required (Notify the In-country Sponsor of BSP Revision Requirement)

This activity begins when the changes warrant the completion of a new site survey. This activity ends when the in-country sponsor is notified.

BASE SUPPORT PLAN PART 2 CORE PROCESS

This process begins at the scheduled time, therefore to properly set a realistic date for the conference it is important to know how long the necessary activities preceding this process take.

AQ. BSP Training (Orientation, Capabilities, and Assessment Briefings)

This activity begins at the scheduled time to kick off a BSP Part 2 conference (or meeting for in-house BSP Part 2) and consists of a battery of briefings that are appropriate for the given scenario. Topics include but are not limited to security and classified procedures, the base support plan objectives and milestones, planned operations tempo and base loading by "C-day," and air base familiarization. The objective of this activity is to orient the attendees to the task at hand, present the capabilities of the site, and present the requirements of the plan.

AR. Functional Area Meetings (work requirements)

Once the battery of briefings has concluded, the representatives of the functional areas meet in work groups. These work-groups are charged with resolving conflicting and competing requirements, shortfalls, and potential limiting factors. These functional work groups meet until all issues are resolved.

AS. Deconflict and Identify Requirements Outside Functional Areas

This activity begins when the functional area work groups break up. Cross-functional requirements are deconflicted and requirements are identified to civil engineering, transportation, services, security police, supply logistics plans, etc.

AT. Collect Data Into Draft BSP Part 2

This activity begins once all the identified requirements are deconflicted and the attendees are in mutual agreement. The BSP team and/or functional areas transcribe the collected data into draft chapters and collectively a draft BSP Part 2. Additionally, finalize shortfalls and LIMFACs with appropriate HHQ. A previous BSP Part 2 being used as a working copy receives a first draft update with the new information collected.

AU. BSP Part 2 Draft Review

This activity begins once the draft BSP Part 2 is complete. The review process must include coordination with all applicable units. This process is completed when the BSP Part 2 is finalized and signed by the approval authority and the attendees are outbriefed.

AV. Publishing and Distribution

This activity begins once the BSP Part 2 is signed and includes all actions necessary to publish and distribute the BSP. Distribution can take many forms such as the U.S. Postal Service, couriers, or the classified Internet. If the BSP is posted on the classified Internet, be sure to transmit a message notifying those on the distribution list. This activity ends when the BSPs have been sent to all those on the distribution list, and the annual review date is set.

Appendix E – BSP Data Worksheet

EVT NODE	ACTIVITY	EVENT/ACTIVITY DESCRIPTION	IMMEDIATE PREDECESSORS
		Base Support Plan Preparation	
1		Air Component Command/MAJCOM Receive Tasking	
	A	Identify and Notify Tasked Units	-
2		Units Notified	
	B	Air Component Command Find and Notifies Sponsor	-
3		Sponsor Notified	
	C	Units Prepare For and Hold BSPC	A, AO
4		BSPC Convened	
	D	Sponsor Identifies and Coordinates POCs	B, AP
	E	Units Identify and Coordinate POCs	C
5		POC Coordination Completed	
	F	Negotiate BSP Completion Dates	D, E
6		DATES SET	
	G	Site Survey Checklist Development/Review	C
	H	Determine BSP Team Composition	C
7		BSP Team Composition Set	
	I	Selection Process of BSP Team and Coordination w/HHQ	F, H
8		BSP Team Selection Complete	
	J	Air Component Command Solicits Country Clearance	I
9		Air Component Command Receives Country Clearance	
	K	Air Component Command Coordinates Country Clearance w/Funding	J
10		Units Receive Country Clearance and Funds	
	L	BSP Team Compliance With Personnel Requirements	K
11		Personnel Requirements Complied With	
	M	Prepare Travel Arrangements and Coordinate	K
12		Travel Arrangements Coordinated	
	N	Personnel Readiness Unit Prepares Orders	L, M
13		BSP Team Set For TDY	
	O	Reception Unit Coordinates Support for Site Survey/Conference	F
	P	Reception Unit Coordinates Support for BSP TDY Personnel	I
	Q	BSP Team Travels to Site	G, N
14		BSP Team Arrives at Site	
		Base Support Plan Part 1	
	R	BSP Chapters Data Collection/Site Survey IAW Checklists	Q, O, P
15		Data Collection Complete	
	S	Consolidation of Data into BSP Part 1 Draft	R
16		BSP Part 1 Draft Complete	

EVT NODE	ACTIVITY	EVENT/ACTIVITY DESCRIPTION	IMMEDIATE PREDECESSORS
	T	BSP Team Departs Site	R
17		BSP Team Arrives Home Station	
	U	BSP Part 1 Draft Review	S
18		BSP Part 1 Finalized	
	V	Publishing and Distribution	T, U
		Base Support Plan Part 2, Delayed (In-house)	
	AA	Solicit Inputs From Tasked Units	T, U
19		Inputs Received	
	AB	Secure Facilities, Equipment, and Planning Document	T, U
20		Support Coordination Complete	
		Go To BSP Part 2 Core Process	
		Base Support Plan Part 2, Delayed (Conference)	
	AC	Air Component Command Solicits Country Clearance	T, U
	AD	Reception Unit Coordinates Support for BSP Part 2 Conference	T, U
	AE	Reception Unit Coordinates Support for BSP TDY Personnel	T, U
21		Air Component Command Receives Country Clearance	
	AF	Air Component Command Coordinates Country Clearance w/Funding	AC
22		Units Receive Country Clearance and Funds	
	AG	BSP Team Compliance With Personnel Requirements	AF
23		Personnel Requirements Complied With	
	AH	Prepare Travel Arrangements and Coordinate	AF
24		Travel Arrangements Coordinated	
	AI	Personnel Readiness Unit Prepares Orders	AG, AH
25		BSP Team Set For TDY	
	AJ	BSP Team Travels to Site	AI
26		BSP Team Arrives at Conference	
		Go To BSP Part 2 Core Process	
		Base Support Plan Part 1 or Part 1 and 2, Update	
	AK	Notify Units of Update Requirement	-
27		Units Notified	
	AL	Tasked Units Review BSP Part 1 or Part 1 and 2, Convene BSPC, and Consolidate Identified Concerns, Shortfalls and LIMFACs	AK
28		Consolidated Package Sent to Air Component Command, Reception Wing, MAJCOM for Consultation and Approval	
	AM	No Changes or Pen & Ink Changes Required	AL
	AN	Rewrite Required (Incorporate Changes, Publish, and Distribute Revised BSP)	AL
	AO	New Site Survey Required (Notify Units of BSP	AL

EVT NODE	ACTIVITY	EVENT/ACTIVITY DESCRIPTION	IMMEDIATE PREDECESSORS
		Revision Requirement)	
	AP	New Site Survey Required (Notify the In-country Sponsor of BSP Revision Requirement)	AL
		BSP Part 2, Initial (Core Process)	
29		Dummy Node to Bring Together BSP Part 2 Processes	
EVT NODE	**ACTIVITY**	**EVENT/ACTIVITY DESCRIPTION**	**IMMEDIATE PREDECESSORS**
	AQ	BSP Training (Orientation, Capabilities, and Assessment Briefings)	T, U, AA, AB, AD, AE, AJ
30		Briefings Complete	
	AR	Functional Area Meetings (Work Requirements)	AQ
31		Requirements Resolved Within Functional Areas	
	AS	Deconflict and Identify Requirements Outside Functional Areas	AR
32		Requirements Resolved	
	AT	Collect Data Into Draft BSP Part 2	AS
33		BSP Part 2 Draft Complete	
	AU	BSP Part 2 Draft Review	AT
34		BSP Part 2 Finalized and Attendees Outbriefed	
	AV	Publishing and Distribution	AU
35		**BSP Part 2 Distributed and Annual Review Data Set**	

Appendix F – Excel Model

Table of Contents

BASE SUPPORT PLAN PERT MODEL WORKBOOK

PURPOSE:

The purpose of this workbook is to model the base support planning processto facilitate "what if" analysis.
The Program Evaluation and Review Technique (PERT) is the underlying modeling approach.

WORKBOOK CONTENTS (seven sheets):

Overview Summary of Workbook

Original Data - PACAF Reference table of all activity times gathered from PACAF experienced planners.

Data Sheet - PACAF Initial BSP Data for the Initial BSP process and four scenarios:
- Scenario #1: STEP replaces BSP Part 1 and BCAT is used for assessments,
- Scenario #2: STEP replaces Draft BSP Part 1 and BCAT is used for assessments,
- Scenario #3: STEP replaces BSP Part 1 and BCAT is not used for assessments, and
- Scenario #4: STEP replaces Draft BSP Part 1 and BCAT is not used for assessments.

Data is converted in two methods:
- Traditional PERT approximation formula (comparison check), and
- Random number generated from triangular distribution.

PERT Logic & Summation Activity times from Data Sheet are summed according to the PERT logic of the BSP Network Diagram. Two columns representing earliest completion times are shown:
- Traditional PERT summation and
- Summation of random numbers generated in Data Sheet (single iteration).

Monte Carlo Simulation Table of 500 random completion times from the End Node (35) of BSP network.

Summary of Results Summary by scenario of completion time statistics.

Additional Information User's guide and construction details

REFERENCE:

This model accompanies AFIT Thesis by Kalosky and Walker (AFIT/GLM/LAL/97S-4)

Original Data - PACAF

	ACTIVITY	Triangular Distribution		
BSP Preparation		**Low**	**Mode**	**High**
A	Identify and Notify Tasked Units	1	13	45
B	Air Component Command Find and Notifies Sponsor	1	7	20
C	Units Prepare For and Hold BSPC	3	21	60
D	Sponsor Identifies and Coordinates POCs	1	8	60
E	Units Identify and Coordinate POCs	2	6	14
F	Negotiate BSP Completion Dates	1	8	30
G	Site Survey Checklist Development/Review	3	5	14
H	Determine BSP Team Composition	1	11	30
I	BSP Team Selection and Coord w/HHQ	1	7	30
J	Air Comp Solicits Country Clearance	1	16	60
K	Air Comp Coord's Country Clearance w/Funding	5	25	60
L	BSP Team Compliance With Personnel Requirements	5	13	30
M	Prepare Travel Arrangements and Coordinate	1	9	21
N	Personnel Readiness Unit Prepares Orders	1	4	14
O	Rec Unit Coord's Support for SS/Conf	3	34	95
P	Rec Unit Coord's Support for BSP TDY Personnel	3	19	30
Q	BSP Team Travels to Site	1	2.5	5
BSP Part 1				
R	BSP Data Collection/Site Survey	2	4	7
S	Consolidation of Data into BSP Part 1 Draft	1	4	10
T	BSP Team Departs Site	1	2.5	5
U	BSP Part 1 Draft Review	7	21	60
V	Publishing and Distribution	5	21	45
BSP Part 2, Delayed (In-house)				
AA	Solicit Inputs From Tasked Units	14	30	60
AB	Secure Facilities, Equipment, and Planning Document	1	6	14
BSP Part 2, Delayed (Conference)				
AC	Air Comp Solicits Country Clearance	1	16	60
AD	Rec Unit Coord's Support for BSP Part 2 Conf	3	18	60
AE	Rec Unit Coord's Support for BSP TDY Personnel	3	10	30
AF	Air Comp Coord's Country Clearance w/Funding	1	15	60
AG	BSP Team Compliance With Personnel Requirements	1	6	14
AH	Prepare Travel Arrangements and Coordinate	1	3	14
AI	Personnel Readiness Unit Prepares Orders	1	2.5	14
AJ	BSP Team Travels to Site	1	2.5	5
BSP Part 1 or Part 1 and 2, Update				
AK	Notify Units of Update Requirement	1	15	30
AL	Tasked Units Review BSP and Consolidate Concerns	14	30	60
AM	No changes or Pen & Ink Changes Required	14	45	180
AN	Changes, Publish, and Distribute Revised BSP	30	55	365
AO	Notify Units of BSP Revision Requirement, and	5	30	60
AP	Notify the In-country Sponsor of BSP Revision Req't	5	14	30
BSP Part 2, Initial (Core Process)				
AQ	BSP Training	0.5	1	2
AR	Functional Area Meetings (Work Requirements)	2	3	5
AS	Deconflict/Identify Req's Outside Functional Areas	1	3	30
AT	Collect Data Into Draft BSP Part 2	1	3	10
AU	BSP Part 2 Draft Review	5	22	60
AV	Publishing and Distribution	5	14	30

Data Sheet - PACAF Initial BSP

ACTIVITY			Duration	Formula	Triangular Distribution			
BSP Preparation					Low	Mode	High	Random
	A	Identify and Notify Tasked Units	16.33	22.89	1	13	45	0.65293
	B	Air Component Command Find and Notifies Sponsor	8.17	6.39	1	7	20	0.25531
	C	Units Prepare For and Hold BSPC	24.50	37.67	3	21	60	0.77569
	D	Sponsor Identifies and Coordinates POCs	15.50	43.98	1	8	60	0.91636
	E	Units Identify and Coordinate POCs	6.67	8.61	2	6	14	0.69684
	F	Negotiate BSP Completion Dates	10.50	17.29	1	8	30	0.74671
	G	Site Survey Checklist Development/Review	6.17	5.36	3	5	14	0.24596
	H	Determine BSP Team Composition	12.50	13.99	1	11	30	0.53498
	I	BSP Team Selection and Coord w/HHQ	9.83	9.05	1	7	30	0.34226
	J	Air Comp Solicits Country Clearance	20.83	31.39	1	16	60	0.68477
	K	Air Comp Coord's Country Clearance w/Funding	27.50	27.10	5	25	60	0.43778
	L	BSP Team Compliance With Personnel Requirements	14.50	14.13	5	13	30	0.40752
	M	Prepare Travel Arrangements and Coordinate	9.67	12.62	1	9	21	0.70718
	N	Personnel Readiness Unit Prepares Orders	5.17	6.37	1	4	14	0.55223
	O	Rec Unit Coord's Support for SS/Conf	39.00	23.75	3	34	95	0.15104
	P	Rec Unit Coord's Support for BSP TDY Personnel	18.17	15.15	3	19	30	0.34191
	Q	BSP Team Travels to Site	2.67	2.47	1	2.5	5	0.35884
BSP Part 1								
	R	BSP Data Collection/Site Survey	4.17	3.87	2	4	7	0.35090
	S	Consolidation of Data into BSP Part 1 Draft	4.50	3.17	1	4	10	0.17464
	T	BSP Team Departs Site	2.67	2.32	1	2.5	5	0.29060
	U	BSP Part 1 Draft Review	25.17	20.14	7	21	60	0.23267
	V	Publishing and Distribution	22.33	10.66	5	21	45	0.05010
BSP Part 2, Delayed (In-house)								
	AA	Solicit Inputs From Tasked Units	0.00	0.00	0	0	0	0.39984
	AB	Secure Facilities, Equipment, and Planning Document	0.00	0.00	0	0	0	0.52502
BSP Part 2, Delayed (Conference)								
	AC	Air Comp Solicits Country Clearance	0.00	0.00	0	0	0	0.77409
	AD	Rec Unit Coord's Support for BSP Part 2 Conf	0.00	0.00	0	0	0	0.78684
	AE	Rec Unit Coord's Support for BSP TDY Personnel	0.00	0.00	0	0	0	0.90384
	AF	Air Comp Coord's Country Clearance w/Funding	0.00	0.00	0	0	0	0.05332
	AG	BSP Team Compliance With Personnel Requirements	0.00	0.00	0	0	0	0.93685
	AH	Prepare Travel Arrangements and Coordinate	0.00	0.00	0	0	0	0.23559
	AI	Personnel Readiness Unit Prepares Orders	0.00	0.00	0	0	0	0.33968
	AJ	BSP Team Travels to Site	0.00	0.00	0	0	0	0.62836
BSP Part 1 or Part 1 and 2, Update								
	AK	Notify Units of Update Requirement	0.00	0.00	0	0	0	0.68368
	AL	Tasked Units Review BSP and Consolidate Concerns	0.00	0.00	0	0	0	0.16225
	AM	No Changes or Pen & Ink Changes Required	0.00	0.00	0	0	0	0.01781
	AN	Changes, Publish, and Distribute Revised BSP	0.00	0.00	0	0	0	0.17379
	AO	Notify Units of BSP Revision Requirement, and	0.00	0.00	0	0	0	0.10100
	AP	Notify the In-country Sponsor of BSP Revision Req't	0.00	0.00	0	0	0	0.33987
BSP Part 2, Initial (Core Process)								
	AQ	BSP Training	1.08	0.95	0.5	1	2	0.27178
	AR	Functional Area Meetings (Work Requirements)	3.17	2.89	2	3	5	0.26413
	AS	Deconflict/Identify Req's Outside Functional Areas	7.17	17.27	1	3	30	0.79300
	AT	Collect Data Into Draft BSP Part 2	3.83	6.92	1	3	10	0.84987
	AU	BSP Part 2 Draft Review	25.50	23.72	5	22	60	0.37039
	AV	Publishing and Distribution	15.17	23.72	5	14	30	0.90125

Data Sheet - Scenario 1

ACTIVITY			Duration	Formula	Triangular Distribution			
BSP Preparation					Low	Mode	High	Random
	A	Identify and Notify Tasked Units	16.33	28.67	1	13	45	0.81064
	B	Air Component Command Find and Notifies Sponsor	8.17	3.49	1	7	20	0.05454
	C	Units Prepare For and Hold BSPC	24.50	23.20	3	21	60	0.39068
	D	Sponsor Identifies and Coordinates POCs	15.50	21.36	1	8	60	0.51341
	E	Units Identify and Coordinate POCs	6.67	4.73	2	6	14	0.15562
	F	Negotiate BSP Completion Dates	10.50	9.04	1	8	30	0.31157
	G	Site Survey Checklist Development/Review	0.00	0.00	0	0	0	0.65697
	H	Determine BSP Team Composition	12.50	19.16	1	11	30	0.78663
	I	BSP Team Selection and Coord w/HHQ	9.83	7.81	1	7	30	0.26205
	J	Air Comp Solicits Country Clearance	20.83	5.86	1	16	60	0.02668
	K	Air Comp Coord's Country Clearance w/Funding	27.50	22.47	5	25	60	0.27755
	L	BSP Team Compliance With Personnel Requirements	14.50	26.20	5	13	30	0.96600
	M	Prepare Travel Arrangements and Coordinate	9.67	13.59	1	9	21	0.77118
	N	Personnel Readiness Unit Prepares Orders	5.17	5.38	1	4	14	0.42842
	O	Rec Unit Coord's Support for SS/Conf	39.00	58.91	3	34	95	0.76787
	P	Rec Unit Coord's Support for BSP TDY Personnel	18.17	19.47	3	19	30	0.62637
	Q	BSP Team Travels to Site	2.67	1.93	1	2.5	5	0.14290
BSP Part 1								
	R	BSP Data Collection/Site Survey	5.00	3.58	3	5	7	0.04133
	S	Consolidation of Data into BSP Part 1 Draft	0.00	0.00	0	0	0	0.86965
	T	BSP Team Departs Site	2.67	3.84	1	2.5	5	0.86536
	U	BSP Part 1 Draft Review	15.50	24.54	7	14	30	0.91902
	V	Publishing and Distribution	1.08	1.42	0.5	1	2	0.77881
BSP Part 2, Delayed (In-house)								
	AA	Solicit Inputs From Tasked Units	0.00	0.00	0	0	0	0.02938
	AB	Secure Facilities, Equipment, and Planning Document	0.00	0.00	0	0	0	0.78768
BSP Part 2, Delayed (Conference)								
	AC	Air Comp Solicits Country Clearance	0.00	0.00	0	0	0	0.38067
	AD	Rec Unit Coord's Support for BSP Part 2 Conf	0.00	0.00	0	0	0	0.76674
	AE	Rec Unit Coord's Support for BSP TDY Personnel	0.00	0.00	0	0	0	0.03641
	AF	Air Comp Coord's Country Clearance w/Funding	0.00	0.00	0	0	0	0.36634
	AG	BSP Team Compliance With Personnel Requirements	0.00	0.00	0	0	0	0.72632
	AH	Prepare Travel Arrangements and Coordinate	0.00	0.00	0	0	0	0.51874
	AI	Personnel Readiness Unit Prepares Orders	0.00	0.00	0	0	0	0.48837
	AJ	BSP Team Travels to Site	0.00	0.00	0	0	0	0.10124
BSP Part 1 or Part 1 and 2, Update								
	AK	Notify Units of Update Requirement	0.00	0.00	0	0	0	0.01485
	AL	Tasked Units Review BSP and Consolidate Concerns	0.00	0.00	0	0	0	0.88706
	AM	No Changes or Pen & Ink Changes Required	0.00	0.00	0	0	0	0.65255
	AN	Changes, Publish, and Distribute Revised BSP	0.00	0.00	0	0	0	0.20308
	AO	Notify Units of BSP Revision Requirement, and	0.00	0.00	0	0	0	0.89706
	AP	Notify the In-country Sponsor of BSP Revision Req't	0.00	0.00	0	0	0	0.58026
BSP Part 2, Initial (Core Process)								
	AQ	BSP Training	1.08	1.25	0.5	1	2	0.62716
	AR	Functional Area Meetings (Work Requirements)	1.92	2.32	0.5	2	3	0.81320
	AS	Deconflict/Identify Req's Outside Functional Areas	0.00	0.00	0	0	0	0.26449
	AT	Collect Data Into Draft BSP Part 2	3.83	5.72	1	3	10	0.70920
	AU	BSP Part 2 Draft Review	25.50	22.71	5	22	60	0.33474
	AV	Publishing and Distribution	15.17	21.73	5	14	30	0.82885

Data Sheet - Scenario 2

ACTIVITY			Duration	Formula	Triangular Distribution			
BSP Preparation					Low	Mode	High	Random
	A	Identify and Notify Tasked Units	16.33	18.69	1	13	45	0.50827
	B	Air Component Command Find and Notifies Sponsor	8.17	14.21	1	7	20	0.86430
	C	Units Prepare For and Hold BSPC	24.50	10.30	3	21	60	0.05200
	D	Sponsor Identifies and Coordinates POCs	15.50	36.62	1	8	60	0.82179
	E	Units Identify and Coordinate POCs	6.67	5.74	2	6	14	0.29158
	F	Negotiate BSP Completion Dates	10.50	19.22	1	8	30	0.81785
	G	Site Survey Checklist Development/Review	0.00	0.00	0	0	0	0.45684
	H	Determine BSP Team Composition	12.50	5.74	1	11	30	0.07751
	I	BSP Team Selection and Coord w/HHQ	9.83	15.57	1	7	30	0.68780
	J	Air Comp Solicits Country Clearance	20.83	48.66	1	16	60	0.95046
	K	Air Comp Coord's Country Clearance w/Funding	27.50	36.20	5	25	60	0.70571
	L	BSP Team Compliance With Personnel Requirements	14.50	13.49	5	13	30	0.35887
	M	Prepare Travel Arrangements and Coordinate	9.67	18.97	1	9	21	0.98291
	N	Personnel Readiness Unit Prepares Orders	5.17	6.48	1	4	14	0.56540
	O	Rec Unit Coord's Support for SS/Conf	39.00	37.35	3	34	95	0.40773
	P	Rec Unit Coord's Support for BSP TDY Personnel	18.17	10.60	3	19	30	0.13381
	Q	BSP Team Travels to Site	2.67	2.31	1	2.5	5	0.28703
BSP Part 1								
	R	BSP Data Collection/Site Survey	5.00	4.11	3	5	7	0.15519
	S	Consolidation of Data into BSP Part 1 Draft	0.00	0.00	0	0	0	0.23663
	T	BSP Team Departs Site	2.67	3.95	1	2.5	5	0.88942
	U	BSP Part 1 Draft Review	25.17	13.94	7	21	60	0.06483
	V	Publishing and Distribution	22.33	15.56	5	21	45	0.17420
BSP Part 2, Delayed (In-house)								
	AA	Solicit Inputs From Tasked Units	0.00	0.00	0	0	0	0.67783
	AB	Secure Facilities, Equipment, and Planning Document	0.00	0.00	0	0	0	0.52352
BSP Part 2, Delayed (Conference)								
	AC	Air Comp Solicits Country Clearance	0.00	0.00	0	0	0	0.32393
	AD	Rec Unit Coord's Support for BSP Part 2 Conf	0.00	0.00	0	0	0	0.78007
	AE	Rec Unit Coord's Support for BSP TDY Personnel	0.00	0.00	0	0	0	0.86860
	AF	Air Comp Coord's Country Clearance w/Funding	0.00	0.00	0	0	0	0.50725
	AG	BSP Team Compliance With Personnel Requirements	0.00	0.00	0	0	0	0.31487
	AH	Prepare Travel Arrangements and Coordinate	0.00	0.00	0	0	0	0.88465
	AI	Personnel Readiness Unit Prepares Orders	0.00	0.00	0	0	0	0.49340
	AJ	BSP Team Travels to Site	0.00	0.00	0	0	0	0.88650
BSP Part 1 or Part 1 and 2, Update								
	AK	Notify Units of Update Requirement	0.00	0.00	0	0	0	0.06442
	AL	Tasked Units Review BSP and Consolidate Concerns	0.00	0.00	0	0	0	0.19019
	AM	No Changes or Pen & Ink Changes Required	0.00	0.00	0	0	0	0.18307
	AN	Changes, Publish, and Distribute Revised BSP	0.00	0.00	0	0	0	0.14428
	AO	Notify Units of BSP Revision Requirement, and	0.00	0.00	0	0	0	0.24712
	AP	Notify the In-country Sponsor of BSP Revision Req't	0.00	0.00	0	0	0	0.44436
BSP Part 2, Initial (Core Process)								
	AQ	BSP Training	1.08	0.81	0.5	1	2	0.13148
	AR	Functional Area Meetings (Work Requirements)	1.92	2.23	0.5	2	3	0.75989
	AS	Deconflict/Identify Req's Outside Functional Areas	0.00	0.00	0	0	0	0.32792
	AT	Collect Data Into Draft BSP Part 2	3.83	2.59	1	3	10	0.13971
	AU	BSP Part 2 Draft Review	25.50	28.91	5	22	60	0.53762
	AV	Publishing and Distribution	15.17	14.26	5	14	30	0.38065

Data Sheet - Scenario 3

ACTIVITY			Duration	Formula	Triangular Distribution			
BSP Preparation					Low	Mode	High	Random
	A	Identify and Notify Tasked Units	16.33	9.03	1	13	45	0.12212
	B	Air Component Command Find and Notifies Sponsor	8.17	4.22	1	7	20	0.09092
	C	Units Prepare For and Hold BSPC	24.50	44.53	3	21	60	0.89236
	D	Sponsor Identifies and Coordinates POCs	15.50	24.62	1	8	60	0.59207
	E	Units Identify and Coordinate POCs	6.67	7.61	2	6	14	0.57462
	F	Negotiate BSP Completion Dates	10.50	4.71	1	8	30	0.06785
	G	Site Survey Checklist Development/Review	0.00	0.00	0	0	0	0.94011
	H	Determine BSP Team Composition	12.50	9.91	1	11	30	0.27388
	I	BSP Team Selection and Coord w/HHQ	9.83	8.69	1	7	30	0.31932
	J	Air Comp Solicits Country Clearance	20.83	26.09	1	16	60	0.55718
	K	Air Comp Coord's Country Clearance w/Funding	27.50	43.78	5	25	60	0.86329
	L	BSP Team Compliance With Personnel Requirements	14.50	14.72	5	13	30	0.45033
	M	Prepare Travel Arrangements and Coordinate	9.67	5.33	1	9	21	0.11732
	N	Personnel Readiness Unit Prepares Orders	5.17	7.33	1	4	14	0.65746
	O	Rec Unit Coord's Support for SS/Conf	39.00	24.73	3	34	95	0.16551
	P	Rec Unit Coord's Support for BSP TDY Personnel	18.17	18.50	3	19	30	0.55646
	Q	BSP Team Travels to Site	2.67	2.51	1	2.5	5	0.37770
BSP Part 1								
	R	BSP Data Collection/Site Survey	5.00	4.84	3	5	7	0.42238
	S	Consolidation of Data into BSP Part 1 Draft	0.00	0.00	0	0	0	0.01580
	T	BSP Team Departs Site	2.67	1.78	1	2.5	5	0.10038
	U	BSP Part 1 Draft Review	15.50	12.27	7	14	30	0.17278
	V	Publishing and Distribution	1.08	1.18	0.5	1	2	0.55686
BSP Part 2, Delayed (In-house)								
	AA	Solicit Inputs From Tasked Units	0.00	0.00	0	0	0	0.27445
	AB	Secure Facilities, Equipment, and Planning Document	0.00	0.00	0	0	0	0.20172
BSP Part 2, Delayed (Conference)								
	AC	Air Comp Solicits Country Clearance	0.00	0.00	0	0	0	0.82049
	AD	Rec Unit Coord's Support for BSP Part 2 Conf	0.00	0.00	0	0	0	0.92268
	AE	Rec Unit Coord's Support for BSP TDY Personnel	0.00	0.00	0	0	0	0.08957
	AF	Air Comp Coord's Country Clearance w/Funding	0.00	0.00	0	0	0	0.60064
	AG	BSP Team Compliance With Personnel Requirements	0.00	0.00	0	0	0	0.55070
	AH	Prepare Travel Arrangements and Coordinate	0.00	0.00	0	0	0	0.28453
	AI	Personnel Readiness Unit Prepares Orders	0.00	0.00	0	0	0	0.35924
	AJ	BSP Team Travels to Site	0.00	0.00	0	0	0	0.52033
BSP Part 1 or Part 1 and 2, Update								
	AK	Notify Units of Update Requirement	0.00	0.00	0	0	0	0.55446
	AL	Tasked Units Review BSP and Consolidate Concerns	0.00	0.00	0	0	0	0.64009
	AM	No Changes or Pen & Ink Changes Required	0.00	0.00	0	0	0	0.17049
	AN	Changes, Publish, and Distribute Revised BSP	0.00	0.00	0	0	0	0.24793
	AO	Notify Units of BSP Revision Requirement, and	0.00	0.00	0	0	0	0.97516
	AP	Notify the In-country Sponsor of BSP Revision Req't	0.00	0.00	0	0	0	0.85060
BSP Part 2, Initial (Core Process)								
	AQ	BSP Training	1.08	1.11	0.5	1	2	0.47385
	AR	Functional Area Meetings (Work Requirements)	3.17	3.17	2	3	5	0.43960
	AS	Deconflict/Identify Req's Outside Functional Areas	7.17	12.80	1	3	30	0.62236
	AT	Collect Data Into Draft BSP Part 2	3.83	4.37	1	3	10	0.49694
	AU	BSP Part 2 Draft Review	25.50	30.37	5	22	60	0.58001
	AV	Publishing and Distribution	15.17	15.24	5	14	30	0.45508

Data Sheet - Scenario 4

ACTIVITY			Duration	Formula	Triangular Distribution			
BSP Preparation					Low	Mode	High	Random
	A	Identify and Notify Tasked Units	16.33	7.91	1	13	45	0.09041
	B	Air Component Command Find and Notifies Sponsor	8.17	6.31	1	7	20	0.24762
	C	Units Prepare For and Hold BSPC	24.50	19.27	3	21	60	0.25812
	D	Sponsor Identifies and Coordinates POCs	15.50	5.54	1	8	60	0.05000
	E	Units Identify and Coordinate POCs	6.67	8.05	2	6	14	0.63108
	F	Negotiate BSP Completion Dates	10.50	8.59	1	8	30	0.28179
	G	Site Survey Checklist Development/Review	0.00	0.00	0	0	0	0.84300
	H	Determine BSP Team Composition	12.50	13.78	1	11	30	0.52272
	I	BSP Team Selection and Coord w/HHQ	9.83	7.59	1	7	30	0.24675
	J	Air Comp Solicits Country Clearance	20.83	27.94	1	16	60	0.60412
	K	Air Comp Coord's Country Clearance w/Funding	27.50	29.46	5	25	60	0.51536
	L	BSP Team Compliance With Personnel Requirements	14.50	15.14	5	13	30	0.48053
	M	Prepare Travel Arrangements and Coordinate	9.67	11.59	1	9	21	0.63102
	N	Personnel Readiness Unit Prepares Orders	5.17	3.31	1	4	14	0.13679
	O	Rec Unit Coord's Support for SS/Conf	39.00	33.16	3	34	95	0.31890
	P	Rec Unit Coord's Support for BSP TDY Personnel	18.17	26.19	3	19	30	0.95124
	Q	BSP Team Travels to Site	2.67	2.07	1	2.5	5	0.18997
BSP Part 1								
	R	BSP Data Collection/Site Survey	5.00	5.36	3	5	7	0.66215
	S	Consolidation of Data into BSP Part 1 Draft	0.00	0.00	0	0	0	0.53604
	T	BSP Team Departs Site	2.67	4.73	1	2.5	5	0.99260
	U	BSP Part 1 Draft Review	25.17	29.92	7	21	60	0.56214
	V	Publishing and Distribution	22.33	20.02	5	21	45	0.35244
BSP Part 2, Delayed (In-house)								
	AA	Solicit Inputs From Tasked Units	0.00	0.00	0	0	0	0.30945
	AB	Secure Facilities, Equipment, and Planning Document	0.00	0.00	0	0	0	0.52786
BSP Part 2, Delayed (Conference)								
	AC	Air Comp Solicits Country Clearance	0.00	0.00	0	0	0	0.97498
	AD	Rec Unit Coord's Support for BSP Part 2 Conf	0.00	0.00	0	0	0	0.10139
	AE	Rec Unit Coord's Support for BSP TDY Personnel	0.00	0.00	0	0	0	0.84909
	AF	Air Comp Coord's Country Clearance w/Funding	0.00	0.00	0	0	0	0.82238
	AG	BSP Team Compliance With Personnel Requirements	0.00	0.00	0	0	0	0.34219
	AH	Prepare Travel Arrangements and Coordinate	0.00	0.00	0	0	0	0.90389
	AI	Personnel Readiness Unit Prepares Orders	0.00	0.00	0	0	0	0.26328
	AJ	BSP Team Travels to Site	0.00	0.00	0	0	0	0.68232
BSP Part 1 or Part 1 and 2, Update								
	AK	Notify Units of Update Requirement	0.00	0.00	0	0	0	0.69692
	AL	Tasked Units Review BSP and Consolidate Concerns	0.00	0.00	0	0	0	0.06267
	AM	No Changes or Pen & Ink Changes Required	0.00	0.00	0	0	0	0.41104
	AN	Changes, Publish, and Distribute Revised BSP	0.00	0.00	0	0	0	0.74760
	AO	Notify Units of BSP Revision Requirement, and	0.00	0.00	0	0	0	0.28190
	AP	Notify the In-country Sponsor of BSP Revision Req't	0.00	0.00	0	0	0	0.33673
BSP Part 2, Initial (Core Process)								
	AQ	BSP Training	1.08	1.11	0.5	1	2	0.47410
	AR	Functional Area Meetings (Work Requirements)	3.17	4.57	2	3	5	0.96867
	AS	Deconflict/Identify Req's Outside Functional Areas	7.17	4.89	1	3	30	0.19466
	AT	Collect Data Into Draft BSP Part 2	3.83	8.71	1	3	10	0.97373
	AU	BSP Part 2 Draft Review	25.50	35.18	5	22	60	0.70530
	AV	Publishing and Distribution	15.17	12.69	5	14	30	0.26285

PERT Logic & Summation

EVENT		Earliest Time	Monte Carlo
BSP Preparation		of Occurrence	
	1 Air Comp/MAJCOM Receive Tasking	0	0
	2 Units Notified	16.33	22.89
	3 Sponsor Notified	8.17	6.39
	4 BSPC Convened	40.83	60.56
	5 POC Coordination Completed	47.50	69.17
	6 DATES SET	58.00	86.46
	7 BSP Team Composition Set	58.00	86.46
	8 BSP Team Selection Complete	67.83	95.51
	9 Air Comp Receives Country Clearance	88.67	126.90
	10 Units Receive Country Clearance and Funds	116.17	154.01
	11 Personnel Requirements Complied With	130.67	168.14
	12 Travel Arrangements Coordinated	125.83	166.62
	13 BSP Team Set For TDY	135.83	174.51
	14 BSP Team Arrives at Site	138.50	176.98
BSP Part 1			
	15 Data Collection Complete	142.67	180.85
	16 BSP Part 1 Draft Complete	147.17	184.02
	17 BSP Team Arrives Home Station	145.33	183.17
	18 BSP Part 1 Finalized	172.33	204.16
BSP Part 2, Delayed (In-house)			
	19 Inputs Received	172.33	204.16
	20 Support Coordination Complete	172.33	204.16
BSP Part 2, Delayed (Conference)			
	21 Air Comp Receives Country Clearance	172.33	204.16
	22 Units Receive Country Clearance and Funds	172.33	204.16
	23 Personnel Requirements Complied With	172.33	204.16
	24 Travel Arrangements Coordinated	172.33	204.16
	25 BSP Team Set For TDY	172.33	204.16
	26 BSP Team Arrives at Conference	172.33	204.16
BSP Part 1 or Part 1 and 2, Update			
	27 Units Notified	0.00	0.00
	28 Consolidated Package Consultation and Approval	0.00	0.00
BSP Part 2, Initial (Core Process)			
	29 Dummy Node	172.33	204.16
	30 Briefings Complete	173.42	205.11
	31 Requirements Resolved Within Functional Areas	176.58	208.00
	32 Requirements Resolved	183.75	225.27
	33 BSP Part 2 Draft Complete	187.58	232.20
	34 BSP Part 2 Finalized and Attendees Outbriefed	213.08	255.92
End			
	35 BSPs Distributed and Annual Review Data Set	228.25	279.64

PERT Logic & Summation - Scenario 1

EVENT		Earliest Time of Occurrence		Monte Carlo
BSP Preparation				
	1 Air Comp/MAJCOM Receive Tasking	0		0
	2 Units Notified	16.33		28.67
	3 Sponsor Notified	8.17		3.49
	4 BSPC Convened	40.83		51.87
	5 POC Coordination Completed	47.50		56.60
	6 DATES SET	58.00		65.64
	7 BSP Team Composition Set	58.00		71.02
	8 BSP Team Selection Complete	67.83		78.84
	9 Air Comp Receives Country Clearance	88.67		84.70
	10 Units Receive Country Clearance and Funds	116.17		107.17
	11 Personnel Requirements Complied With	130.67		133.37
	12 Travel Arrangements Coordinated	125.83		120.76
	13 BSP Team Set For TDY	135.83		138.75
	14 BSP Team Arrives at Site	138.50		140.68
BSP Part 1				
	15 Data Collection Complete	143.50		144.25
	16 BSP Part 1 Draft Complete	143.50		144.25
	17 BSP Team Arrives Home Station	146.17		148.09
	18 BSP Part 1 Finalized	159.00		168.79
BSP Part 2, Delayed (In-house)				
	19 Inputs Received	159.00		168.79
	20 Support Coordination Complete	159.00		168.79
BSP Part 2, Delayed (Conference)				
	21 Air Comp Receives Country Clearance	159.00		168.79
	22 Units Receive Country Clearance and Funds	159.00		168.79
	23 Personnel Requirements Complied With	159.00		168.79
	24 Travel Arrangements Coordinated	159.00		168.79
	25 BSP Team Set For TDY	159.00		168.79
	26 BSP Team Arrives at Conference	159.00		168.79
BSP Part 1 or Part 1 and 2, Update				
	27 Units Notified	0.00		0.00
	28 Consolidated Package Consultation and Approval	0.00		0.00
BSP Part 2, Initial (Core Process)				
	29 Dummy Node	159.00		168.79
	30 Briefings Complete	160.08		170.04
	31 Requirements Resolved Within Functional Areas	162.00		172.36
	32 Requirements Resolved	162.00		172.36
	33 BSP Part 2 Draft Complete	165.83		178.08
	34 BSP Part 2 Finalized and Attendees Outbriefed	191.33		200.79
End				
	35 BSPs Distributed and Annual Review Data Set	206.50		222.52

PERT Logic & Summation - Scenario 2

	EVENT		Earliest Time of Occurrence	Monte Carlo
BSP Preparation				
	1	Air Comp/MAJCOM Receive Tasking	0	0
	2	Units Notified	16.33	18.69
	3	Sponsor Notified	8.17	14.21
	4	BSPC Convened	40.83	28.99
	5	POC Coordination Completed	47.50	50.83
	6	DATES SET	58.00	70.05
	7	BSP Team Composition Set	58.00	70.05
	8	BSP Team Selection Complete	67.83	85.62
	9	Air Comp Receives Country Clearance	88.67	134.28
	10	Units Receive Country Clearance and Funds	116.17	170.48
	11	Personnel Requirements Complied With	130.67	189.45
	12	Travel Arrangements Coordinated	125.83	189.45
	13	BSP Team Set For TDY	135.83	195.93
	14	BSP Team Arrives at Site	138.50	198.25
BSP Part 1				
	15	Data Collection Complete	143.50	202.36
	16	BSP Part 1 Draft Complete	143.50	202.36
	17	BSP Team Arrives Home Station	146.17	206.31
	18	BSP Part 1 Finalized	168.67	216.30
BSP Part 2, Delayed (In-house)				
	19	Inputs Received	168.67	216.30
	20	Support Coordination Complete	168.67	216.30
BSP Part 2, Delayed (Conference)				
	21	Air Comp Receives Country Clearance	168.67	216.30
	22	Units Receive Country Clearance and Funds	168.67	216.30
	23	Personnel Requirements Complied With	168.67	216.30
	24	Travel Arrangements Coordinated	168.67	216.30
	25	BSP Team Set For TDY	168.67	216.30
	26	BSP Team Arrives at Conference	168.67	216.30
BSP Part 1 or Part 1 and 2, Update				
	27	Units Notified	0.00	0.00
	28	Consolidated Package Consultation and Approval	0.00	0.00
BSP Part 2, Initial (Core Process)				
	29	Dummy Node	168.67	216.30
	30	Briefings Complete	169.75	217.11
	31	Requirements Resolved Within Functional Areas	171.67	219.34
	32	Requirements Resolved	171.67	219.34
	33	BSP Part 2 Draft Complete	175.50	221.92
	34	BSP Part 2 Finalized and Attendees Outbriefed	201.00	250.83
End				
	35	BSPs Distributed and Annual Review Data Set	216.17	265.09

PERT Logic & Summation - Scenario 3

EVENT	Earliest Time of Occurence	Monte Carlo
BSP Preparation		
1 Air Comp/MAJCOM Receive Tasking	0	0
2 Units Notified	16.33	9.03
3 Sponsor Notified	8.17	4.22
4 BSPC Convened	40.83	53.56
5 POC Coordination Completed	47.50	61.17
6 DATES SET	58.00	65.88
7 BSP Team Composition Set	58.00	65.88
8 BSP Team Selection Complete	67.83	74.57
9 Air Comp Receives Country Clearance	88.67	100.67
10 Units Receive Country Clearance and Funds	116.17	144.45
11 Personnel Requirements Complied With	130.67	159.16
12 Travel Arrangements Coordinated	125.83	149.78
13 BSP Team Set For TDY	135.83	166.49
14 BSP Team Arrives at Site	138.50	168.99
BSP Part 1		
15 Data Collection Complete	143.50	173.83
16 BSP Part 1 Draft Complete	143.50	173.83
17 BSP Team Arrives Home Station	146.17	175.61
18 BSP Part 1 Finalized	159.00	186.11
BSP Part 2, Delayed (In-house)		
19 Inputs Received	159.00	186.11
20 Support Coordination Complete	159.00	186.11
BSP Part 2, Delayed (Conference)		
21 Air Comp Receives Country Clearance	159.00	186.11
22 Units Receive Country Clearance and Funds	159.00	186.11
23 Personnel Requirements Complied With	159.00	186.11
24 Travel Arrangements Coordinated	159.00	186.11
25 BSP Team Set For TDY	159.00	186.11
26 BSP Team Arrives at Conference	159.00	186.11
BSP Part 1 or Part 1 and 2, Update		
27 Units Notified	0.00	0.00
28 Consolidated Package Consultation and Approval	0.00	0.00
BSP Part 2, Initial (Core Process)		
29 Dummy Node	159.00	186.11
30 Briefings Complete	160.08	187.22
31 Requirements Resolved Within Functional Areas	163.25	190.39
32 Requirements Resolved	170.42	203.19
33 BSP Part 2 Draft Complete	174.25	207.56
34 BSP Part 2 Finalized and Attendees Outbriefed	199.75	237.93
End		
35 BSPs Distributed and Annual Review Data Set	214.92	253.17

PERT Logic & Summation - Scenario 4

EVENT		Earliest Time	Monte Carlo
BSP Preparation		of Occurrence	
1	Air Comp/MAJCOM Receive Tasking	0	0
2	Units Notified	16.33	7.91
3	Sponsor Notified	8.17	6.31
4	BSPC Convened	40.83	27.18
5	POC Coordination Completed	47.50	35.23
6	DATES SET	58.00	43.83
7	BSP Team Composition Set	58.00	43.83
8	BSP Team Selection Complete	67.83	51.41
9	Air Comp Receives Country Clearance	88.67	79.35
10	Units Receive Country Clearance and Funds	116.17	108.81
11	Personnel Requirements Complied With	130.67	123.95
12	Travel Arrangements Coordinated	125.83	120.40
13	BSP Team Set For TDY	135.83	127.26
14	BSP Team Arrives at Site	138.50	129.33
BSP Part 1			
15	Data Collection Complete	143.50	134.68
16	BSP Part 1 Draft Complete	143.50	134.68
17	BSP Team Arrives Home Station	146.17	139.41
18	BSP Part 1 Finalized	168.67	164.60
BSP Part 2, Delayed (In-house)			
19	Inputs Received	168.67	164.60
20	Support Coordination Complete	168.67	164.60
BSP Part 2, Delayed (Conference)			
21	Air Comp Receives Country Clearance	168.67	164.60
22	Units Receive Country Clearance and Funds	168.67	164.60
23	Personnel Requirements Complied With	168.67	164.60
24	Travel Arrangements Coordinated	168.67	164.60
25	BSP Team Set For TDY	168.67	164.60
26	BSP Team Arrives at Conference	168.67	164.60
BSP Part 1 or Part 1 and 2, Update			
27	Units Notified	0.00	0.00
28	Consolidated Package Consultation and Approval	0.00	0.00
BSP Part 2, Initial (Core Process)			
29	Dummy Node	168.67	164.60
30	Briefings Complete	169.75	165.71
31	Requirements Resolved Within Functional Areas	172.92	170.28
32	Requirements Resolved	180.08	175.17
33	BSP Part 2 Draft Complete	183.92	183.88
34	BSP Part 2 Finalized and Attendees Outbriefed	209.42	219.06
End			
35	BSPs Distributed and Annual Review Data Set	224.58	231.75

Monte Carlo Iterations - Original Data

Simulation Results:

279.6

Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result
1	240.9	51	271.4	101	289.7	151	252.8	201	250.3	251	272.1	301	245.5	351	290.8	401	266.1	451	300.3
2	268.0	52	247.9	102	251.6	152	233.3	202	249.5	252	314.5	302	292.3	352	299.5	402	211.2	452	329.4
3	237.4	53	241.9	103	295.1	153	312.6	203	291.3	253	250.0	303	364.6	353	261.4	403	252.7	453	241.1
4	273.0	54	223.6	104	345.8	154	277.4	204	213.7	254	294.3	304	321.1	354	309.2	404	300.0	454	227.0
5	298.9	55	243.9	105	281.2	155	275.6	205	246.8	255	253.3	305	286.4	355	217.6	405	288.0	455	293.8
6	206.4	56	296.2	106	285.4	156	291.2	206	227.0	256	263.2	306	317.5	356	217.4	406	278.4	456	282.2
7	291.1	57	241.4	107	280.9	157	271.6	207	269.3	257	205.1	307	267.3	357	243.6	407	275.1	457	276.8
8	233.1	58	309.9	108	317.4	158	270.4	208	280.2	258	295.4	308	269.5	358	298.3	408	265.6	458	235.5
9	333.5	59	301.1	109	303.8	159	276.5	209	280.6	259	324.2	309	302.6	359	286.2	409	289.8	459	263.8
10	268.0	60	261.6	110	273.2	160	283.0	210	285.4	260	338.8	310	256.5	360	270.6	410	253.7	460	276.1
11	253.3	61	279.3	111	252.2	161	328.9	211	243.7	261	280.5	311	253.5	361	261.5	411	219.0	461	263.2
12	275.2	62	285.9	112	278.6	162	285.2	212	263.1	262	222.5	312	312.4	362	263.4	412	246.3	462	270.7
13	322.3	63	243.5	113	298.0	163	298.2	213	226.5	263	282.8	313	275.8	363	247.9	413	236.8	463	274.0
14	227.3	64	275.8	114	268.3	164	272.9	214	238.3	264	269.3	314	260.1	364	268.3	414	223.3	464	257.8
15	249.6	65	272.7	115	277.9	165	278.3	215	265.0	265	264.9	315	239.7	365	290.4	415	244.8	465	251.8
16	290.4	66	252.8	116	267.4	166	199.9	216	231.4	266	228.0	316	290.0	366	287.8	416	305.2	466	236.4
17	284.9	67	290.0	117	263.0	167	279.2	217	277.2	267	234.5	317	206.3	367	309.7	417	258.1	467	267.1
18	293.7	68	246.4	118	290.6	168	261.2	218	237.9	268	244.3	318	330.3	368	243.8	418	258.6	468	247.7
19	250.7	69	285.2	119	274.4	169	256.8	219	282.4	269	223.8	319	278.5	369	340.5	419	257.6	469	252.8
20	251.3	70	242.2	120	295.2	170	247.8	220	304.0	270	273.8	320	281.5	370	263.5	420	310.4	470	288.4
21	259.8	71	281.0	121	316.2	171	244.1	221	297.0	271	320.7	321	301.7	371	330.1	421	218.3	471	289.6
22	272.5	72	251.2	122	308.2	172	236.9	222	266.1	272	268.4	322	221.7	372	269.9	422	265.2	472	309.3
23	286.3	73	280.6	123	325.7	173	258.7	223	226.2	273	267.4	323	237.3	373	302.8	423	331.2	473	310.0
24	253.6	74	266.7	124	291.2	174	264.3	224	316.4	274	255.5	324	279.0	374	242.2	424	274.6	474	300.8
25	265.5	75	279.3	125	280.2	175	324.3	225	219.9	275	261.6	325	242.7	375	304.9	425	254.4	475	237.0
26	251.0	76	297.3	126	248.4	176	256.5	226	284.6	276	242.4	326	232.3	376	264.7	426	264.0	476	310.2
27	286.7	77	330.1	127	259.1	177	284.5	227	284.8	277	254.8	327	287.7	377	336.1	427	228.6	477	241.3
28	230.2	78	277.9	128	290.6	178	221.3	228	243.7	278	282.6	328	273.7	378	254.3	428	282.3	478	304.9
29	275.9	79	265.8	129	201.8	179	261.2	229	274.6	279	319.1	329	262.8	379	317.2	429	325.9	479	242.6
30	314.7	80	260.9	130	227.7	180	306.6	230	278.8	280	237.0	330	265.0	380	324.1	430	248.9	480	236.5
31	257.1	81	261.3	131	295.0	181	285.2	231	260.0	281	256.5	331	253.2	381	302.2	431	263.5	481	274.7
32	260.4	82	336.1	132	266.6	182	264.9	232	251.0	282	254.3	332	305.5	382	227.6	432	282.9	482	267.2
33	270.1	83	271.2	133	227.4	183	272.4	233	231.4	283	232.2	333	239.7	383	283.4	433	252.8	483	249.5
34	261.3	84	259.7	134	229.1	184	224.4	234	233.2	284	270.8	334	291.5	384	191.4	434	282.7	484	289.5
35	317.8	85	280.3	135	280.2	185	280.7	235	303.3	285	271.5	335	263.1	385	269.9	435	237.5	485	284.8
36	272.5	86	243.4	136	252.4	186	285.7	236	291.4	286	343.2	336	262.5	386	267.8	436	328.8	486	239.9
37	304.7	87	282.9	137	302.7	187	285.0	237	268.6	287	265.5	337	267.2	387	304.5	437	206.8	487	263.1
38	302.9	88	274.4	138	300.4	188	341.3	238	241.0	288	274.9	338	282.6	388	315.8	438	221.1	488	275.6
39	283.1	89	263.2	139	269.8	189	240.9	239	264.2	289	266.0	339	206.6	389	276.1	439	243.8	489	248.3
40	187.5	90	266.8	140	241.7	190	237.9	240	240.8	290	293.0	340	229.8	390	282.6	440	290.4	490	250.4
41	270.7	91	198.9	141	313.8	191	216.2	241	336.4	291	285.3	341	269.9	391	265.9	441	278.8	491	224.8
42	282.2	92	287.7	142	279.6	192	246.3	242	268.5	292	266.3	342	229.8	392	241.0	442	281.8	492	226.0
43	244.3	93	230.1	143	249.0	193	262.8	243	232.6	293	261.5	343	288.6	393	241.8	443	275.9	493	255.2
44	259.9	94	279.7	144	265.3	194	272.5	244	263.7	294	264.9	344	308.8	394	228.2	444	264.3	494	231.1
45	223.7	95	266.7	145	236.7	195	275.4	245	222.6	295	253.0	345	324.2	395	303.4	445	299.9	495	232.6
46	287.6	96	270.7	146	298.2	196	239.9	246	274.1	296	287.0	346	264.1	396	227.6	446	202.6	496	289.5
47	279.4	97	265.0	147	288.0	197	295.4	247	238.7	297	251.4	347	265.2	397	274.6	447	253.4	497	271.5
48	251.5	98	213.1	148	210.5	198	358.7	248	279.9	298	296.2	348	250.8	398	237.0	448	256.0	498	252.2
49	310.5	99	275.8	149	243.0	199	254.4	249	274.5	299	277.2	349	275.8	399	235.8	449	275.1	499	298.4
50	294.2	100	265.4	150	272.7	200	269.5	250	269.1	300	264.3	350	272.9	400	243.8	450	286.7	500	262.2

Monte Carlo Iterations - Scenario 1

Simulation Results:

222.5

Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result
1	241.1	51	184.7	101	258.3	151	239.5	201	263.9	251	227.9	301	206.3	351	196.9	401	282.0	451	247.1
2	240.6	52	262.3	102	248.6	152	232.4	202	242.1	252	239.5	302	257.4	352	296.5	402	238.3	452	258.5
3	271.3	53	209.2	103	243.4	153	223.1	203	221.7	253	252.3	303	239.0	353	222.5	403	224.1	453	248.4
4	200.3	54	299.3	104	277.5	154	223.4	204	237.0	254	273.3	304	264.5	354	251.0	404	260.1	454	237.7
5	222.6	55	237.6	105	267.4	155	265.4	205	243.6	255	261.9	305	225.4	355	227.5	405	262.9	455	261.2
6	211.7	56	253.6	106	253.2	156	262.4	206	201.5	256	216.2	306	232.8	356	233.6	406	260.3	456	274.9
7	232.8	57	219.0	107	255.9	157	260.0	207	224.9	257	239.3	307	264.6	357	226.2	407	262.5	457	268.6
8	196.3	58	232.6	108	231.8	158	277.1	208	253.0	258	273.3	308	276.2	358	231.8	408	243.5	458	224.0
9	235.6	59	259.8	109	262.0	159	327.9	209	246.0	259	203.3	309	239.6	359	299.8	409	285.7	459	205.0
10	250.8	60	257.1	110	236.0	160	231.4	210	274.6	260	203.7	310	212.7	360	276.3	410	221.5	460	260.1
11	202.6	61	230.3	111	233.2	161	266.3	211	273.0	261	266.9	311	198.9	361	210.9	411	263.3	461	204.5
12	243.9	62	244.9	112	233.3	162	260.9	212	246.7	262	236.6	312	206.8	362	252.3	412	281.6	462	216.7
13	222.3	63	239.7	113	234.6	163	243.8	213	248.9	263	254.2	313	259.3	363	274.1	413	204.5	463	262.0
14	215.0	64	271.0	114	280.1	164	214.3	214	232.3	264	230.8	314	228.8	364	247.4	414	241.6	464	236.1
15	234.4	65	231.1	115	229.2	165	228.0	215	240.1	265	247.6	315	230.9	365	225.3	415	239.7	465	239.0
16	233.4	66	209.9	116	222.7	166	239.2	216	242.8	266	256.8	316	277.9	366	262.9	416	220.4	466	272.7
17	249.9	67	255.3	117	283.6	167	246.5	217	252.1	267	246.9	317	219.7	367	256.1	417	309.7	467	242.9
18	278.2	68	284.0	118	251.7	168	260.1	218	237.0	268	268.2	318	247.0	368	209.4	418	201.7	468	230.0
19	208.0	69	248.8	119	262.5	169	239.9	219	248.9	269	178.2	319	190.3	369	231.3	419	229.9	469	280.3
20	227.8	70	241.2	120	207.4	170	251.2	220	234.0	270	248.6	320	214.0	370	213.8	420	232.8	470	257.9
21	233.6	71	277.5	121	274.5	171	242.8	221	221.9	271	248.2	321	226.4	371	199.0	421	197.8	471	239.1
22	255.4	72	269.3	122	224.8	172	216.7	222	225.0	272	209.2	322	232.9	372	231.4	422	215.3	472	222.1
23	217.7	73	267.2	123	233.0	173	258.7	223	224.6	273	220.3	323	185.1	373	269.0	423	204.8	473	224.7
24	231.1	74	227.7	124	261.8	174	176.8	224	221.7	274	242.0	324	222.2	374	221.7	424	249.5	474	214.4
25	215.8	75	238.0	125	246.2	175	214.2	225	248.9	275	251.6	325	258.5	375	183.1	425	232.0	475	212.1
26	235.1	76	261.9	126	200.2	176	196.7	226	236.7	276	220.3	326	233.4	376	269.1	426	253.6	476	255.4
27	236.7	77	233.9	127	237.8	177	228.3	227	237.4	277	226.1	327	230.5	377	221.8	427	261.5	477	235.7
28	207.7	78	226.5	128	224.4	178	235.0	228	224.4	278	279.8	328	220.1	378	244.2	428	201.0	478	238.9
29	201.0	79	239.3	129	204.3	179	221.9	229	179.1	279	271.7	329	289.4	379	235.0	429	221.2	479	231.2
30	299.8	80	245.7	130	275.4	180	249.2	230	253.8	280	226.8	330	225.4	380	251.0	430	215.7	480	223.3
31	231.2	81	245.6	131	241.1	181	234.1	231	280.7	281	269.3	331	229.7	381	235.2	431	195.5	481	258.6
32	242.4	82	207.8	132	250.8	182	224.3	232	278.2	282	251.0	332	214.7	382	273.4	432	264.0	482	232.3
33	229.4	83	261.3	133	231.7	183	228.5	233	253.2	283	277.1	333	251.3	383	182.2	433	225.9	483	222.2
34	245.3	84	172.1	134	240.4	184	220.3	234	215.5	284	204.7	334	243.7	384	234.8	434	234.6	484	282.2
35	243.8	85	253.0	135	283.8	185	247.9	235	220.4	285	236.3	335	262.4	385	222.2	435	195.3	485	192.9
36	214.7	86	235.2	136	222.2	186	247.0	236	205.0	286	198.9	336	263.1	386	229.2	436	253.4	486	238.6
37	270.7	87	206.3	137	241.4	187	183.0	237	249.1	287	192.5	337	254.5	387	216.9	437	198.6	487	238.9
38	266.5	88	234.9	138	250.8	188	226.9	238	205.6	288	210.0	338	255.2	388	236.5	438	268.9	488	206.5
39	269.6	89	258.3	139	278.8	189	226.6	239	256.4	289	212.0	339	241.3	389	255.5	439	221.3	489	255.7
40	271.4	90	301.9	140	234.8	190	228.1	240	227.6	290	252.3	340	202.2	390	186.3	440	212.9	490	207.9
41	241.6	91	235.9	141	262.0	191	274.2	241	213.4	291	221.5	341	229.3	391	224.9	441	222.0	491	195.2
42	175.4	92	225.2	142	285.8	192	226.7	242	276.2	292	237.7	342	234.1	392	283.4	442	258.3	492	240.8
43	276.7	93	230.7	143	203.6	193	230.0	243	291.8	293	248.9	343	201.4	393	322.8	443	250.3	493	223.5
44	221.8	94	285.2	144	262.8	194	224.9	244	225.1	294	272.3	344	260.3	394	186.5	444	204.1	494	194.7
45	267.9	95	245.6	145	267.7	195	258.7	245	224.2	295	245.6	345	236.7	395	240.2	445	263.0	495	275.4
46	195.2	96	232.1	146	242.8	196	213.6	246	255.8	296	202.2	346	192.4	396	174.1	446	241.8	496	294.6
47	280.3	97	272.4	147	229.3	197	197.9	247	240.6	297	260.4	347	271.3	397	240.0	447	271.9	497	227.7
48	255.9	98	259.4	148	240.8	198	259.1	248	284.0	298	240.2	348	198.0	398	236.1	448	291.5	498	253.1
49	269.2	99	170.7	149	246.4	199	266.8	249	313.1	299	231.6	349	263.1	399	240.8	449	249.5	499	191.0
50	193.1	100	228.4	150	236.8	200	228.0	250	198.7	300	233.6	350	206.2	400	224.6	450	257.9	500	261.2

Monte Carlo Iterations - Scenario 2

Simulation Results:

	265.1

Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result
2	250.4	52	229.8	102	260.3	152	269.1	202	212.6	252	245.9	302	230.7	352	306.2	402	267.3	452	245.3
3	296.8	53	233.1	103	255.2	153	241.6	203	261.6	253	260.6	303	270.6	353	283.1	403	244.2	453	254.3
4	279.6	54	211.4	104	267.0	154	228.1	204	265.3	254	268.2	304	223.1	354	223.4	404	232.2	454	328.6
5	276.4	55	281.5	105	284.2	155	276.7	205	281.8	255	251.5	305	178.7	355	194.5	405	251.5	455	216.2
6	266.0	56	282.7	106	260.6	156	236.6	206	219.7	256	221.3	306	216.4	356	284.0	406	247.5	456	303.9
7	267.4	57	299.3	107	269.1	157	252.9	207	201.6	257	243.7	307	222.8	357	224.8	407	278.9	457	271.1
8	279.5	58	237.4	108	248.0	158	288.4	208	266.6	258	245.1	308	251.1	358	262.5	408	238.1	458	236.1
9	243.6	59	224.6	109	265.9	159	215.5	209	254.8	259	257.4	309	288.1	359	264.7	409	283.4	459	239.0
10	274.9	60	257.6	110	304.7	160	221.2	210	282.3	260	243.4	310	240.5	360	243.5	410	225.3	460	262.3
11	292.3	61	306.9	111	245.6	161	256.8	211	268.5	261	224.8	311	268.3	361	331.5	411	219.6	461	259.7
12	300.7	62	271.0	112	230.6	162	247.0	212	226.6	262	253.6	312	295.0	362	205.8	412	245.4	462	236.4
13	270.9	63	245.0	113	219.0	163	255.4	213	231.2	263	251.6	313	239.2	363	271.5	413	231.0	463	234.2
14	304.4	64	288.7	114	235.2	164	250.0	214	210.0	264	257.9	314	257.3	364	231.1	414	225.4	464	256.3
15	252.2	65	202.9	115	239.3	165	275.8	215	230.5	265	207.3	315	229.2	365	279.8	415	231.3	465	221.3
16	237.7	66	209.1	116	318.2	166	218.1	216	282.3	266	190.5	316	304.1	366	310.3	416	287.2	466	309.7
17	233.4	67	254.6	117	233.1	167	205.3	217	286.3	267	243.3	317	254.6	367	238.7	417	229.9	467	207.8
18	270.0	68	274.0	118	270.5	168	265.7	218	236.1	268	224.9	318	222.3	368	216.6	418	264.1	468	231.8
19	284.6	69	260.4	119	215.3	169	241.2	219	258.2	269	221.1	319	221.8	369	270.6	419	215.3	469	299.2
20	309.2	70	268.8	120	262.9	170	275.7	220	227.7	270	221.7	320	284.3	370	273.7	420	233.9	470	254.6
21	256.3	71	294.9	121	290.9	171	256.8	221	311.4	271	219.2	321	200.0	371	256.0	421	237.1	471	224.6
22	236.5	72	243.7	122	231.3	172	250.4	222	217.6	272	269.6	322	234.4	372	276.7	422	257.5	472	292.5
23	221.6	73	274.3	123	218.2	173	249.7	223	268.5	273	219.6	323	259.4	373	228.2	423	211.9	473	232.8
24	233.9	74	244.1	124	275.7	174	258.5	224	246.3	274	217.2	324	246.9	374	257.9	424	227.6	474	239.9
25	234.4	75	290.4	125	238.3	175	218.2	225	228.8	275	238.0	325	224.4	375	304.5	425	214.5	475	229.1
26	263.0	76	248.0	126	262.1	176	253.2	226	227.4	276	199.0	326	261.7	376	284.1	426	248.8	476	260.9
27	252.8	77	205.8	127	286.4	177	227.0	227	250.7	277	234.6	327	223.6	377	281.8	427	267.8	477	277.7
28	280.5	78	290.9	128	201.4	178	283.7	228	289.6	278	318.5	328	222.6	378	182.6	428	213.2	478	202.7
29	262.1	79	232.2	129	255.9	179	278.4	229	238.1	279	200.4	329	254.0	379	236.8	429	260.6	479	225.8
30	245.1	80	264.6	130	260.1	180	224.0	230	238.5	280	226.6	330	232.3	380	305.0	430	255.9	480	272.2
31	265.2	81	250.9	131	219.7	181	233.2	231	271.0	281	293.1	331	233.4	381	235.7	431	280.6	481	252.9
32	283.5	82	280.6	132	236.3	182	296.2	232	230.1	282	225.8	332	276.1	382	291.0	432	237.9	482	243.4
33	263.0	83	252.3	133	254.0	183	212.2	233	212.3	283	255.6	333	214.5	383	241.4	433	273.0	483	253.7
34	212.4	84	272.6	134	224.3	184	247.6	234	260.8	284	274.4	334	253.3	384	224.3	434	252.7	484	232.7
35	237.0	85	198.4	135	218.7	185	286.3	235	225.7	285	216.3	335	233.5	385	239.3	435	291.1	485	255.8
36	247.6	86	250.2	136	288.5	186	277.9	236	253.1	286	268.4	336	271.6	386	244.0	436	234.1	486	280.4
37	259.9	87	243.9	137	274.1	187	249.8	237	282.6	287	294.0	337	270.5	387	228.7	437	260.4	487	230.7
38	222.6	88	275.0	138	266.4	188	214.7	238	249.5	288	281.7	338	327.1	388	204.1	438	308.0	488	235.8
39	288.2	89	206.3	139	254.6	189	301.9	239	219.9	289	179.1	339	240.3	389	249.4	439	253.5	489	285.0
40	245.9	90	251.2	140	190.2	190	250.7	240	304.7	290	255.5	340	285.3	390	240.7	440	227.6	490	288.5
41	263.6	91	235.7	141	282.9	191	294.9	241	245.1	291	256.7	341	268.4	391	245.1	441	234.1	491	306.0
42	291.6	92	309.4	142	325.6	192	273.3	242	220.1	292	324.4	342	266.9	392	243.8	442	253.8	492	264.7
43	227.8	93	266.1	143	239.9	193	206.4	243	281.1	293	273.7	343	234.3	393	245.7	443	281.0	493	241.7
44	253.7	94	260.5	144	261.9	194	256.2	244	236.1	294	292.5	344	248.9	394	263.2	444	249.3	494	224.8
45	203.5	95	225.7	145	310.8	195	249.6	245	264.0	295	273.4	345	268.2	395	264.2	445	214.9	495	258.1
46	277.2	96	233.7	146	251.1	196	244.5	246	266.5	296	238.1	346	235.9	396	234.7	446	272.6	496	281.9
47	234.4	97	228.7	147	247.0	197	254.3	247	237.0	297	266.2	347	253.6	397	269.5	447	244.9	497	198.5
48	289.6	98	222.7	148	258.5	198	273.6	248	257.5	298	236.8	348	228.4	398	249.0	448	252.7	498	271.0
49	337.2	99	202.9	149	298.1	199	222.1	249	311.7	299	284.0	349	247.7	399	249.7	449	289.3	499	232.4
50	227.7	100	259.2	150	233.9	200	301.0	250	277.1	300	278.6	350	210.2	400	292.4	450	204.9	500	256.9

Monte Carlo Iterations - Scenario 3

Simulation Results:

	253.2

Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result
1	274.0	51	222.7	101	225.4	151	310.2	201	253.4	251	289.0	301	208.5	351	209.0	401	249.2	451	237.8
2	241.0	52	267.6	102	244.7	152	224.8	202	280.3	252	243.0	302	234.3	352	295.7	402	265.8	452	297.0
3	280.5	53	249.5	103	265.1	153	269.8	203	291.0	253	251.9	303	272.1	353	276.4	403	215.6	453	273.0
4	253.1	54	254.3	104	287.2	154	244.6	204	232.3	254	283.0	304	224.7	354	262.8	404	308.6	454	289.5
5	248.8	55	228.2	105	268.7	155	221.2	205	295.8	255	255.3	305	312.2	355	294.4	405	298.6	455	254.1
6	258.5	56	260.1	106	269.8	156	277.6	206	218.4	256	273.8	306	286.6	356	196.2	406	229.0	456	239.2
7	255.8	57	217.0	107	273.8	157	251.1	207	265.9	257	270.2	307	258.8	357	234.1	407	240.2	457	258.4
8	279.1	58	251.0	108	255.7	158	245.3	208	262.1	258	265.5	308	278.8	358	261.0	408	246.0	458	266.1
9	316.8	59	284.7	109	287.1	159	261.3	209	223.9	259	197.2	309	288.4	359	274.6	409	277.5	459	232.4
10	282.4	60	217.0	110	211.3	160	258.4	210	238.7	260	269.4	310	250.5	360	239.2	410	274.3	460	264.7
11	274.8	61	272.0	111	267.5	161	293.6	211	261.8	261	225.2	311	280.3	361	220.1	411	278.4	461	251.0
12	243.6	62	228.8	112	282.1	162	236.2	212	265.1	262	262.9	312	250.0	362	240.3	412	235.4	462	250.8
13	265.4	63	284.4	113	303.4	163	222.4	213	243.1	263	220.2	313	260.7	363	264.3	413	240.2	463	211.2
14	246.4	64	226.5	114	277.0	164	218.7	214	254.7	264	247.4	314	258.6	364	251.1	414	235.7	464	264.0
15	302.7	65	289.7	115	219.9	165	269.9	215	218.9	265	207.9	315	229.6	365	258.0	415	226.0	465	220.4
16	275.4	66	275.3	116	239.9	166	198.8	216	216.0	266	293.9	316	231.4	366	219.4	416	255.6	466	224.9
17	271.8	67	290.0	117	237.6	167	283.8	217	276.0	267	242.4	317	264.1	367	248.1	417	295.1	467	194.4
18	258.3	68	253.4	118	236.0	168	217.5	218	250.8	268	213.2	318	244.0	368	243.6	418	255.4	468	233.7
19	293.4	69	242.3	119	270.2	169	202.8	219	265.8	269	237.6	319	309.1	369	276.2	419	260.2	469	266.4
20	292.7	70	304.4	120	200.7	170	247.4	220	309.7	270	247.1	320	267.3	370	300.2	420	259.7	470	262.0
21	242.3	71	190.8	121	274.6	171	244.7	221	252.3	271	225.0	321	259.5	371	243.5	421	257.8	471	232.4
22	237.5	72	234.5	122	265.0	172	291.9	222	240.1	272	347.2	322	220.0	372	238.1	422	288.4	472	216.8
23	268.3	73	270.3	123	224.6	173	283.2	223	221.3	273	277.8	323	223.3	373	223.9	423	217.1	473	230.2
24	298.1	74	300.0	124	177.6	174	239.3	224	277.8	274	304.0	324	266.2	374	297.0	424	312.9	474	235.6
25	250.8	75	287.4	125	276.0	175	198.0	225	278.0	275	253.5	325	257.9	375	231.9	425	260.1	475	273.4
26	244.8	76	265.8	126	219.8	176	269.5	226	277.7	276	217.7	326	293.1	376	277.0	426	278.4	476	304.8
27	266.2	77	238.5	127	242.5	177	237.7	227	294.6	277	241.6	327	281.0	377	229.9	427	247.6	477	332.5
28	271.5	78	280.6	128	261.0	178	206.7	228	222.8	278	235.3	328	214.8	378	239.2	428	309.2	478	248.9
29	273.0	79	243.1	129	242.5	179	256.4	229	232.0	279	230.0	329	265.4	379	290.7	429	187.1	479	220.7
30	269.5	80	237.0	130	247.4	180	329.7	230	264.1	280	277.4	330	321.9	380	284.7	430	269.6	480	277.5
31	232.6	81	274.5	131	307.6	181	253.2	231	216.8	281	282.8	331	245.8	381	290.1	431	304.7	481	294.1
32	251.5	82	257.8	132	292.7	182	234.5	232	237.1	282	255.5	332	241.3	382	233.6	432	218.4	482	250.6
33	282.6	83	219.3	133	235.3	183	241.9	233	282.1	283	271.6	333	231.5	383	285.5	433	265.7	483	199.9
34	281.3	84	301.4	134	251.6	184	233.9	234	283.3	284	286.1	334	219.2	384	292.9	434	260.7	484	327.9
35	273.0	85	275.0	135	237.8	185	289.8	235	210.4	285	233.2	335	213.2	385	241.4	435	251.9	485	300.5
36	293.5	86	249.8	136	230.8	186	300.6	236	292.6	286	222.2	336	279.2	386	234.2	436	228.6	486	295.2
37	281.8	87	261.3	137	238.4	187	295.8	237	268.5	287	256.3	337	195.5	387	252.3	437	248.5	487	221.8
38	271.7	88	220.6	138	289.9	188	243.6	238	274.5	288	267.7	338	246.5	388	253.3	438	231.0	488	259.9
39	273.2	89	259.3	139	287.4	189	238.5	239	190.8	289	261.1	339	289.9	389	232.1	439	274.6	489	249.5
40	222.7	90	258.1	140	296.8	190	221.8	240	212.5	290	239.8	340	207.3	390	255.8	440	197.5	490	251.5
41	229.1	91	272.2	141	290.6	191	301.2	241	269.7	291	244.1	341	250.9	391	323.3	441	225.5	491	272.3
42	281.8	92	259.0	142	238.7	192	272.6	242	280.7	292	256.4	342	232.2	392	214.5	442	263.8	492	213.9
43	279.9	93	242.5	143	266.2	193	229.1	243	236.0	293	203.1	343	222.7	393	257.6	443	244.9	493	233.6
44	232.4	94	233.5	144	249.6	194	281.2	244	313.1	294	272.9	344	198.2	394	226.6	444	289.3	494	271.8
45	231.0	95	255.2	145	228.7	195	273.6	245	277.3	295	254.7	345	246.1	395	235.3	445	262.5	495	313.1
46	266.8	96	231.9	146	273.4	196	245.1	246	304.0	296	214.6	346	303.4	396	313.7	446	282.2	496	212.9
47	287.1	97	242.0	147	262.1	197	246.6	247	258.6	297	294.3	347	265.5	397	293.2	447	253.2	497	254.4
48	260.8	98	268.2	148	233.9	198	238.3	248	271.6	298	284.0	348	254.5	398	299.0	448	246.3	498	248.1
49	231.5	99	282.1	149	224.0	199	272.8	249	204.0	299	262.5	349	255.7	399	294.9	449	274.3	499	199.7
50	256.4	100	275.4	150	219.6	200	265.2	250	273.0	300	209.6	350	246.7	400	296.9	450	241.1	500	244.1

Monte Carlo Iterations - Scenario 4

Simulation Results:

	231.8

Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result	Trial	Result
1	266.7	51	274.0	101	267.4	151	245.3	201	279.3	251	276.8	301	264.6	351	285.8	401	300.3	451	266.5
2	231.2	52	364.8	102	257.6	152	303.8	202	303.7	252	247.6	302	213.1	352	252.7	402	276.7	452	298.2
3	230.2	53	238.9	103	250.1	153	305.6	203	250.3	253	234.0	303	220.5	353	285.4	403	273.1	453	281.8
4	298.5	54	249.9	104	272.0	154	266.2	204	261.6	254	269.0	304	240.9	354	224.6	404	295.3	454	279.8
5	240.1	55	302.2	105	251.1	155	315.4	205	214.2	255	270.5	305	270.0	355	274.9	405	265.0	455	226.1
6	249.4	56	307.6	106	251.6	156	248.7	206	233.0	256	243.7	306	231.8	356	279.5	406	272.5	456	271.0
7	224.5	57	303.1	107	280.0	157	233.4	207	273.6	257	265.4	307	239.3	357	253.1	407	262.9	457	286.2
8	225.7	58	273.6	108	264.5	158	217.9	208	263.7	258	210.5	308	262.9	358	261.2	408	269.8	458	241.4
9	280.8	59	270.5	109	254.7	159	272.5	209	322.6	259	242.5	309	247.2	359	261.2	409	254.4	459	250.7
10	207.5	60	291.7	110	266.5	160	261.2	210	310.9	260	268.5	310	304.1	360	314.9	410	228.8	460	294.1
11	327.9	61	225.6	111	274.7	161	299.4	211	198.8	261	325.7	311	344.1	361	266.7	411	271.4	461	264.1
12	263.8	62	275.1	112	256.8	162	247.6	212	267.9	262	264.6	312	255.9	362	230.7	412	289.0	462	265.9
13	268.3	63	214.6	113	294.2	163	274.4	213	249.3	263	245.6	313	304.7	363	277.6	413	300.0	463	261.7
14	219.8	64	302.3	114	234.5	164	238.7	214	281.0	264	282.2	314	217.3	364	276.1	414	243.7	464	273.2
15	262.9	65	262.6	115	243.4	165	314.8	215	225.2	265	210.0	315	291.3	365	236.2	415	236.4	465	233.2
16	273.2	66	212.5	116	251.6	166	253.3	216	266.8	266	219.8	316	210.7	366	204.0	416	250.5	466	288.8
17	321.1	67	307.5	117	261.2	167	269.0	217	249.7	267	261.9	317	251.2	367	233.4	417	292.7	467	271.9
18	257.3	68	253.2	118	249.2	168	277.0	218	251.7	268	311.9	318	209.2	368	294.4	418	249.7	468	228.2
19	260.9	69	272.1	119	255.0	169	265.3	219	281.9	269	280.1	319	298.0	369	247.1	419	266.4	469	286.3
20	263.0	70	282.8	120	290.6	170	215.7	220	222.4	270	225.2	320	297.9	370	283.6	420	253.1	470	257.8
21	277.8	71	275.2	121	242.5	171	244.5	221	228.5	271	220.3	321	291.5	371	294.3	421	266.2	471	233.4
22	252.0	72	231.1	122	305.0	172	288.5	222	257.2	272	258.1	322	235.8	372	278.4	422	271.1	472	268.2
23	282.6	73	227.9	123	265.6	173	247.5	223	271.1	273	280.6	323	238.4	373	293.6	423	270.3	473	274.8
24	239.9	74	235.6	124	291.6	174	236.8	224	301.8	274	268.0	324	222.7	374	234.5	424	279.7	474	318.3
25	228.4	75	271.6	125	243.3	175	353.4	225	291.9	275	307.4	325	232.6	375	298.4	425	261.8	475	225.8
26	255.9	76	215.1	126	262.1	176	261.2	226	276.2	276	296.0	326	291.5	376	250.0	426	318.4	476	257.1
27	275.2	77	298.7	127	276.7	177	264.0	227	290.0	277	241.7	327	306.8	377	232.8	427	262.0	477	263.2
28	287.9	78	268.9	128	268.5	178	262.6	228	297.4	278	295.2	328	273.4	378	300.1	428	260.2	478	264.0
29	298.3	79	300.3	129	290.7	179	255.2	229	253.5	279	238.6	329	251.9	379	242.5	429	255.1	479	262.0
30	251.9	80	313.5	130	268.8	180	260.8	230	239.7	280	328.8	330	253.9	380	271.1	430	271.9	480	292.9
31	280.3	81	228.2	131	262.2	181	244.5	231	267.9	281	272.4	331	255.4	381	223.3	431	277.0	481	267.3
32	318.5	82	304.3	132	236.0	182	263.0	232	261.9	282	223.2	332	267.7	382	247.1	432	310.4	482	263.0
33	255.1	83	266.5	133	238.2	183	253.7	233	309.1	283	287.8	333	245.7	383	270.4	433	285.4	483	274.5
34	262.9	84	224.4	134	300.1	184	276.6	234	234.3	284	280.8	334	266.1	384	190.3	434	267.0	484	260.0
35	245.2	85	188.3	135	274.2	185	323.3	235	258.1	285	206.9	335	262.6	385	276.0	435	258.1	485	298.0
36	245.0	86	283.5	136	247.8	186	267.2	236	225.4	286	298.3	336	267.1	386	281.0	436	248.1	486	264.2
37	263.0	87	259.1	137	252.8	187	295.5	237	324.0	287	281.6	337	271.8	387	275.4	437	246.9	487	271.0
38	236.8	88	244.1	138	257.0	188	259.1	238	267.0	288	287.1	338	264.4	388	233.4	438	275.3	488	244.5
39	244.5	89	217.3	139	211.6	189	289.1	239	248.6	289	290.9	339	256.7	389	234.5	439	317.7	489	217.5
40	265.0	90	297.9	140	317.6	190	290.1	240	278.3	290	256.4	340	285.6	390	248.1	440	238.1	490	247.1
41	294.3	91	253.1	141	271.7	191	284.6	241	289.3	291	254.7	341	261.0	391	297.9	441	263.4	491	240.6
42	327.8	92	219.6	142	243.1	192	265.7	242	254.1	292	257.5	342	283.1	392	232.3	442	274.7	492	231.1
43	263.5	93	301.9	143	277.8	193	223.7	243	294.8	293	275.8	343	264.0	393	267.5	443	257.6	493	260.9
44	239.0	94	255.4	144	289.7	194	286.2	244	266.1	294	282.4	344	220.1	394	317.1	444	221.3	494	273.2
45	279.7	95	287.8	145	244.4	195	270.2	245	287.6	295	290.3	345	241.5	395	271.9	445	294.8	495	271.5
46	246.9	96	262.3	146	231.6	196	223.3	246	246.0	296	302.9	346	249.9	396	289.5	446	239.8	496	233.1
47	287.5	97	277.1	147	243.9	197	214.8	247	242.1	297	228.0	347	277.1	397	267.9	447	282.5	497	267.5
48	259.5	98	301.5	148	235.9	198	280.4	248	259.8	298	249.8	348	248.1	398	235.5	448	283.3	498	246.8
49	222.3	99	237.1	149	256.0	199	240.7	249	294.3	299	234.3	349	314.4	399	256.8	449	258.5	499	294.7
50	306.0	100	271.2	150	259.9	200	309.4	250	277.5	300	299.4	350	252.9	400	254.1	450	244.0	500	259.7

Summary of Results

Command:	PACAF		
Base Type:	GENERAL		
DATE:	28-Jul-97		
Scenario:	BASELINE		
Time to Complete			
	Average:		269.4
	Std Dev:		29.9
	Maximum:		369.3
	Minimum:		195.5
Probability to Complete (Days)			
	200		0.004
	210		0.016
	240		0.17
	270		0.509
	280		0.634
	300		0.862
	330		0.973

Command:	PACAF		
Base Type:	GENERAL		
DATE:	28-Jul-97		
Scenario:	ONE		
Time to Complete			
	Average:		239.1
	Std Dev:		26.3
	Maximum:		327.9
	Minimum:		170.7
Probability to Complete (Days)			
	200		0.071
	210		0.144
	240		0.537
	270		0.877
	280		0.944
	300		0.99
	330		#N/A

Command:	PACAF		
Base Type:	GENERAL		
DATE:	28-Jul-97		
Scenario:	TWO		
Time to Complete			
	Average:		252.4
	Std Dev:		28.5
	Maximum:		337.2
	Minimum:		178.7
Probability to Complete (Days)			
	200		0.018
	210		0.056
	240		0.372
	270		0.729
	280		0.818
	300		0.942
	330		0.996

Command:	PACAF		
Base Type:	GENERAL		
DATE:	28-Jul-97		
Scenario:	THREE		
Time to Complete			
	Average:		256.2
	Std Dev:		28.8
	Maximum:		347.2
	Minimum:		177.6
Probability to Complete (Days)			
	200		0.026
	210		0.047
	240		0.308
	270		0.667
	280		0.786
	300		0.937
	330		0.996

Command:	PACAF		
Base Type:	GENERAL		
DATE:	28-Jul-97		
Scenario:	FOUR		
Time to Complete			
	Average:		264.4
	Std Dev:		27.4
	Maximum:		364.8
	Minimum:		188.3
Probability to Complete (Days)			
	200		0.004
	210		0.014
	240		0.191
	270		0.592
	280		0.731
	300		0.898
	330		0.994

Additional Information for Excel Spreadsheet of BSP PERT Model Workbook

Worksheet 1: Overview

This sheet provides a brief summary of the BSP PERT Model Workbook to include a general purpose of the model, a table of contents, and the reference thesis for this model.

Worksheet 2: Original Data - PACAF

This sheet is the storage point for all original data assembled from PACAF on the general BSP process. The data includes the preparations prior to and including the initial and update BSP processes for Parts 1 and 2.

The data gathered is in the three input parameter format: most optimistic, likely, and pessimistic completion times. If probability distributions other than Triangular are used, then data for the particular parameters for each distribution can be stored similarly. This data should also be protected since no entries are required.

One of these sheets is necessary for any baseline scenario under evaluation. For example, USAFE bare base processes.

Worksheet 3: Data Sheet - PACAF INITIAL BSP

This sheet is used for the specific BSP process being studied. In this thesis, the process used for evaluation is the Initial BSP process in the PACAF area of responsibility (AOR). The worksheet format is similar to Worksheet 2 with several added features.

First, the Triangular Distribution block is expanded to include a random number column. These numbers are used to calculate the expected activity duration for one iteration of the Monte Carlo simulation. The Excel function to generate a random number is *rand()*.

The next feature is the addition of two columns called duration and formula. The formula column is where the four columns of the Triangular Distribution block are combined to form the expected activity time using the simulation. An example formula for cell E3, the activity A formula cell, is as follows:

=IF(AND((F3=0),(G3=0),(H3=0)),0,IF(I3<(G3-F3)/(H3-F3),F3+SQRT((G3-F3)*(H3-F3)*I3),H3-SQRT((H3-G3)*(H3-F3)*(1-I3)))) (F.1)

where,

F3, G3, and H3 are the low, mode, and high estimates respectively, and

I3 is the random number.

In the above formula, the logical *AND* function is used to prevent a divide by zero error. The nested *IF* function determines which nested formula to use to generate a random variable based on the number generated by the *rand()* function. The basic formula is derived by applying the inverse transform technique to the Triangular distribution (29:697).

The duration column is the computed activity duration using the theoretical PERT methodology. This column is provided for comparison purposes to the simulated data or

if the use of this simpler method is desired. An example formula for cell D3, the activity A Duration cell, is as follows:

=(F3+(4*G3)+H3)/6 (F.2)

Another feature of Excel employed on this worksheet is the *Tools - Scenarios* function. BSP scenarios can be defined here by making changes to the baseline data. The *Workgroups* toolbar provides easy access to changing the scenarios for "what if" analysis.

The authors advise that the scenarios be defined prior to recording any simulation runs for ease of manipulation and to promote independence between random samples. For the purpose of this study, the random samples generated by the simulation must be independent. To ensure independence, the simulations were run in succession, as opposed to separate sessions or interrupted sessions. By following this method, each number generated by the *rand()* function was unique and served as a seed for each successive number.

The final added feature to this sheet is the use of cell names. Cells are named to simplify building and reviewing formulas in the PERT Logic & Summation Worksheet. The cells in the Duration and Formula columns are named to represent each activity (e.g., MIA = Monte Carlo/Initial/activity A). To name a cell, use Excel's *Insert - Name - Define* function.

Worksheet 4: PERT Logic & Summation

This worksheet applies the PERT logic to and sums the data created by Worksheet 3. The data represents the earliest time of occurrence for each node in the BSP PERT Network culminating with the estimated completion time in node 35. As in Worksheet 3, there are two columns of data representing the Monte Carlo simulation data and the traditional PERT calculations. Table F-1 shows the logic representing the Monte Carlo column of formulas.

Worksheet 5: Monte Carlo Simulation

This worksheet generates each iteration of the Monte Carlo simulation and displays each data point for all iterations. For this research, 500 iterations were created. To generate the simulation, Excel's *Data - Table* command is used. Using Worksheet 5 as a reference, create a column of numbers from 1-500 (desired number of iterations). In the next column to the right and one cell above the column of numbers, create a link the estimated completion (=+'PERT Logic & Summation'!H43). Next, highlight the 2 x 501 table that includes the 500 numbers and the link. Finally, select *Data - Table*, click inside the *column input cell*, address any blank cell in spreadsheet, and click *OK*. The spreadsheet now simulates the 500 independent realizations of completion times in a table of data which can be further analyzed. The scenarios can be changed as stated previously. This data is used in the next worksheet.

An additional feature of this worksheet is that the link cell to Worksheet 5 can be changed to any cell in the Monte Carlo column representing an event node. This allows one to simulate the estimated completion time of that specific event.

Table F-1 – PERT Logic

Event Node	PERT Logic
1	0
2	=MAX(MSTART+MIA,H34+MIAO)
3	=MAX(MSTART+MIB,H34+MIAP)
4	=+H4+MIC
5	=MAX(+H5+MID,+H6+MIE)
6	=+H7+MIF
7	=MAX(+H7+MIF,+H6+MIH)
8	=+H9+MII
9	=+H10+MIJ
10	=+H11+MIK
11	=MAX(+H12+MIL,+H12+MIM)
12	=+H12+MIM
13	=MAX(+H13+MIN,+H6+MIG)
14	=MAX(+H15+MIQ,+H10+MIP,+H8+MIO)
15	=+H16+MIR
16	=+H18+MIS
17	=+H18+MIT
18	=MAX(+H18+MIT,+H19+MIU)
19	=MAX(+H21+MIAA,+H21+MIAB)
20	=+H21+MIAB
21	=+H21+MIAC
22	=+H26+MIAF
23	=MAX(+H27+MIAG,+H27+MIAH)
24	=+H27+MIAH
25	=+H28+MIAI
26	=MAX(+H30+MIAJ,+H21+MIAD,+H21+MIAE)
27	=+MSTART+MIAK
28	=+H33+MIAL
29	=MAX(+H21,+H23,+H31)
30	=+H36+MIAQ
31	=+H37+MIAR
32	=+H38+MIAS
33	=+H39+MIAT
34	=+H40+MIAU
35	=MAX(+H21+MIV,+H41+MIAV,+H34+MIAM,+H34+MIAN)

Worksheet 6: Summary of Results

This worksheet presents summary statistics of the simulated completion times generated in Worksheet 5. The functions used are *AVERAGE, STDEV, MIN, MAX* and *PERCENTRANK*. For example, the mean of the 500 completion times is represented by "=AVERAGE('Monte Carlo Simulation'!B3:B502)." The probability of completion numbers simply represent 30 day intervals.

Note: For a complete discussion of each Excel function presented here, see the software *HELP* menu and the Microsoft Excel User's Guide (25).

Appendix G - Glossary

Area of Responsibility - The geographical area associated with a combatant command within which a combatant commander has authority to plan and conduct operations.

Bare Base – A base having a runway, taxiway(s), and parking area(s) which are adequate for the deployed force and possessing an adequate source of water that can be potable.

Base Support Plan (BSP) – The installation level planning accomplished to support unified and specified command wartime operations plans, as well as MAJCOM supporting plans. It cuts across all functional support areas in a consolidated view of installation missions, requirements, capabilities and limitations to plan for actions and resources supporting war or contingency operations, including deployment, post-deployment, and employment activities.

Base Support Planning Committee (BSPC) – A group of cross-functional representatives from base-level host and tenant operations and support agencies whose purpose is to review requirements and develop base support plans. The BSPC serves as the focal point for plan development and reports to the installation commander on the status of base support plans. It serves to integrate the numerous base-level requirements and functional support actions to present a coordinated overview of base support activity in a BSP.

Budget Estimate Submission (BES) – Detailed costing of the Program Objective Memorandum (POM) as modified by the Program Decision Memorandum (PDM) by appropriation and major force program.

Chairman's Guidance (CG) – A CJCS document providing guidance to the Joint Staff and information to the CINCs, Services, and Secretary of Defense regarding the framework for building the National Military Strategy Document (NMSD). Serves as a bridge between initial assessments and conclusions reached by the JCS during the Joint Strategy Review and the process that builds the NMSD.

Chairman's Program Assessment (CPA) – An assessment of the composite Program Objective Memorandum (POM) force recommendations to assist the Secretary of Defense in decisions on the defense program subsequent to receipt of the POMs. Also serves as a key input to the Joint Strategy Review to begin the next strategic planning cycle.

Collocated Operating Base (COB) – An allied base designated for joint or unilateral use by US wartime tactical augmentation forces of for the wartime relocation of inplace US forces. US use of such a base for contingencies or exercises is desirable. War Reserve

Material (WRM) may be for use by these forces. A COB may be a Main, Standby, or Limited Base.

Combatant Command (Command & Authority – COCOM) – Non-transferable command authority established by title 10, United States Code, section 164, exercised only by commanders of unified or specified combatant commands. Combatant Command (command authority) is the authority of a Combatant Commander to perform those functions of command over assigned forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction over all aspects of military operations, joint training, and logistics necessary to accomplish the missions assigned to the command. Combatant Command (command authority) should be exercised through the commanders of subordinate organizations; normally this authority is exercised through the Service component commander. Combatant Command (command authority) provides full authority to organize and employ commands and forces as the CINC considers necessary to accomplish assigned missions. Also called COCOM.

Combatant Commander – A commander in chief of one of the unified or specified combatant commands established by the President.

Commander in Chief (CINC) – The terms "unified commander" and "specified commander" refer to commands established by the President as combatant commands under Section 161, United States Code. The acronym "CINC" refers to the commander of such a command. (See Combatant Command and Combatant Commander.)

Component Command – The component commander and all those individuals, units, detachments, organizations, or installations under his command that have been assigned to the unified command.

Concept of Operations (CONOPS) – Frequently referred to as commander's concept. A verbal or graphic statement, in broad outline, of a commander's assumptions or intent in regard to an operation or series of operations. The concept is designed to give an overall picture of the operation.

Contingency Plan – A plan for major contingencies that can be reasonably be anticipated in principle geographic subareas of a command.

Contingency Planning Guidance (CPG) – The SECDEF's statutory duty to provide annually to the CJCS, written policy guidance for contingency planning. The CPG focuses the guidance provided in the NMS and DPG and directly impacts on the JSCP.

Course of Action (COA) – a. A plan that would accomplish, or is related to, the accomplishment of a mission.

b. The scheme adopted to accomplish a task or mission. It is a product of the Joint Operation Planning and Execution System concept development phase. The supported commander will include a recommended course of action in the commander's estimate. The recommended course of action will include the concept of operations, evaluation of supportability estimates of supporting organizations, and an integrated time-phased data base of combat, combat support, and combat service support forces and sustainment. Refinement of this data base will be contingent on the time available for course of action development. When approved, the course of action becomes the basis for the development for an operation plan or operation order.

Crisis – A crisis is an incident or situation involving a threat to the United States, its territories, citizens, military forces, and possessions or vital interests that develops rapidly and creates a condition of such diplomatic, economic, political, or military importance that commitment of US military forces and resources is contemplated to achieve national objectives.

Defense Planning Guidance (DPG) – The Secretary of Defense's document which provides guidance to the Services on the development of their Program Objective Memorandums (POMs). It is drafted by the Under Secretary of Defense for policy (USD(P)) with the assistance of a DPG Steering Group.

Defense Planning and Resources Board (DPRB) – The corporate review body which assists the Secretary of Defense in managing the Planning, Programming, and Budgeting System (PPBS).

Deliberate Planning – The JOPES process involving the development of joint OPLANs for contingencies identified in joint strategic planning documents. Conducted principally in peacetime, deliberate planning is accomplished in prescribed cycles that complement other DoD planning cycles and in accordance with formally established Joint Strategic Planning System.

Execute Order (EXORD) – An order issued by the Chairman, Joint Chiefs of Staff, by the authority and at the direction of the Secretary of Defense, to implement an NCA decision to initiate military operations.

Joint Chiefs of Staff – An element with the Department of Defense that includes the Joint Chiefs of Staff, and supporting agencies or special offices as designated by the Chairman, Joint Chiefs of Staff.

Joint Operational Planning and Execution System (JOPES) – A system that supports integrated planning and command & control of mobilization, deployment, employment, and sustainment activities using an improved information system.

Joint Strategic Capabilities Plan (JSCP) – The JSPC contains the strategic concept to support the national security objective and military objectives derived, and gives guidance to the CINCs and the Chiefs of the Services for accomplishing military tasks, based on projected military capabilities and conditions during short-range period. It apportions forces and lift assets available for planning.

Joint Strategic Planning System – The JSPS is the primary means by which the Joint Chiefs of Staff discharge their strategic planning responsibilities. It includes the following publications: JSR, CG, NMS, JPD, JSCP, and CPA.

Joint Strategy Review (JSR) – The JCS document initiating the strategic planning cycle. It is the JSPS process for gathering information, raising issues, and facilitating the integrating of the strategy, OPLAN, and program assessments. It provides the principal guidance and support for developing the next Chairman's Guidance (CG), National Military Strategy (NMS), Joint Planning Document (JDS), Joint Strategic Capabilities Plan (JSCP), and Chairman's Program Assessment (CPA).

Limited Base – A base which is austerely manned and normally has no permanently assigned operational tactical forces but may possess a small force for specific operations (weather, surveillance, alert aircraft, special purpose aircraft, etc.). With personnel augmentation, this base is capable of receiving deploying forces. It may have facilities for communications, air traffic control, navigational aids, maintenance, base supply, munitions, weather, medical services, billeting, messing, transportation, and operational support. It may or may not be supported in peacetime as a satellite of a main base. War reserve material, including POL, may be maintained in a state of readiness for use by the deploying force. To initiate and sustain operations, additional support personnel and equipment must be provided.

Limiting Factor (LIMFAC) – A factor or condition that, either temporarily or permanently, impedes mission accomplishment. This limitation has a significant impact on the capability to perform the wartime mission and has become a mission constraint. Illustrative examples are transportation network deficiencies, lack of in-place facilities, malpositioned forces or material, extreme climatic conditions, distance, transit/overflight rights, political conditions, etc.

Main Operating Base (MOB) A base on which all essential buildings and facilities are erected. Total organizational and intermediate maintenance capability exists for assigned weapon systems. The intermediate maintenance capability may be expanded to support specific weapon systems deployed by the MOB.

Major Command (MAJCOM) – A major subdivision of the Air Force; for operational purposes it normally consists of two or more Air Forces.

National Command Authority (NCA) – The President and the Secretary of Defense or their duly deputized alternates or successors.

National Military Strategy Document (NMSD) – Provides the advice of the chairman, in the consultation with other members of the JCS and the CINCs, to the President, SECDEF, and NSC as to the recommended NMS and fiscally constrained force structure required to attain the National Security objectives. The NMS, along with the JPD, is designed to assist the SECDEF in the preparation of the DPG and to guide development of the JSCP.

National Security Council (NSC) – The body in the government specially designed to assist the President in integrating all spheres of policy relating to national security.

Operation Order (OPORD) – A directive issued by a commander to subordinate commanders for the purpose of effecting the coordinated execution of an operation.

Operational Plan (OPLAN) – An operation plan for the conduct of joint operations that can be used as a basis for development of an OPORD. An OPLAN identifies the forces and supplies required to execute the CINC's Strategic Concept and a movement schedule of these resources to the theater of operations. The forces and supplies are identified in time-phased force deployment data (TPFDD) files. OPLANs will include all the phases of the tasked operation. The plan is prepared with the appropriate annexes, appendices, and TPFDD files as described in the JOPES Manuals containing planning policies, procedures, and formats.

Planning Order – **a**. An order issued by the Chairman of the Joint Chiefs of Staff to initiate execution planning. The planning order will normally follow a commander's estimate and a planning order will normally take the place of the Chairman of the Joint Chiefs of Staff alert order. National Command Authorities approval of a selected course of action is not required before issuing a Chairman of Joint Chiefs of Staff planning order.

b. A planning directive that provides essential planning guidance and directs the initiation of execution planning before the directing authority approves a military course of action.

Planning, Programming, and Budgeting System (PPBS) – An integrated system for the establishment, maintenance, and revision of the Future Year Defense Plan (FYDP) and the DoD budget.

Program Decisions Memorandum (PDM) – SECDEF's approval of each Service's Program Objective Memorandum (POM) which forms the basis for developing the Budget Estimate Submission (BES).

Program Objective Memorandum (POM) – The memorandum which the Secretary of a military department or the Director of a defense agency submits to the Secretary of Defense to recommend the total resource requirements within the parameters of the fiscal guidance published by the SECDEF.

Shortfall – The lack of forces, equipment, personnel, material, or capability, identified as a plan requirement that would adversely affect a command's ability to accomplish its mission and that are not immediately available to satisfy mission requirements.

Specified Command – A command that has a broad continuing mission and that is established and so designated by the President through the Secretary of Defense with the advice and assistance of the Joint Chiefs of Staff. It normally is composed of forces from one Service.

Standby Base (SB) – An austere base, designated for wartime use, having adequate airfield facilities to accept deployed aircraft. SBs will be maintained in a caretaker status until augmented, at which time the SB will be capable of receiving and employing assigned aircraft. To initiate and sustain operations, all supporting personnel, supplies, and equipment must be provided POL and munitions may be prepositioned in a state of readiness for use by the deploying forces.

Supported CINC – The Unified or Specified commander-in-chief having primary responsibility for all aspects of a task assigned by the JSCP or by other authority. This term also refers to the commander who originates OPlans in response to requirements of the Joint Chiefs of Staff.

Supported Command – A command receiving and exercising operational control over contingency forces.

Supported Commander – The unified or specified commander having primary responsibility for all aspects of a task assigned in the Joint Strategic Capabilities Plan (JSCP) or otherwise assigned; the commander who originates operations plans in response to requirements of the Joint Chiefs of Staff.

Supporting Command – A command deploying forces to or providing other support to a supported command in a contingency operation.

Supporting Commander – A commander who furnishes augmentation forces or other support to a supported commander or who develops a supporting plan. Includes the designated combatant commands and Defense agencies as appropriate.

Supporting Plan – An operation plan prepared by a supporting commander or a subordinate commander to satisfy requirements of the supported commander's plan.

Tasking – The process of translating the allocation in orders and passing these orders to the units involved. Each order normally contains sufficient detailed instructions to enable the executing agency to accomplish the mission successfully.

Time-Phased Force and Deployment Data (TPFDD) – The data base portion of an operation plan; it contains time-phased force data, non-unit-related cargo and personnel data, and movement data for the operation plan, including:

a. In-place units

b. Units to be deployed to support the OPLAN with a priority indicating the desired sequence for their arrival at the port of debarkation.

c. Routing of forces to be deployed.

d. Movement data associated with deploying forces.

e. Estimates of non-unit-related cargo and personnel movements to be conducted concurrently with the deployment of forces.

f. Estimate of transportation requirements that must be fulfilled by common-user lift resources as well as those requirements that can be fulfilled by assigned or attached transportation resources.

Unified Command – A command with a broad continuing mission under a single commander and composed of significant assigned components of two or more Services. Established with the advice of the Joint Chiefs of Staff or, when so authorized by the Joint Chiefs of Staff, by a commander of an existing unified command established by the President.

Unit Type Code (UTC) – A five-character alphanumeric code that uniquely identifies each force package.

War and Mobilization Plan (WMP) – The WMP provides the Air Staff and Air Force commander with current policies and planning factors for conducting and supporting wartime operations. It establishes requirements for developing mobilization and planning

programs for industrial production to support sustained contingency operations of the programmed forces.

War Reserve Materiel (WRM) – That portion of material, above and beyond peacetime operating stocks, required to support the increase activity of forces during wartime. WRM is necessary to assure the timely response and sustainability of weapons systems to support forces, activities and mission objectives for wartime scenarios consistent with Defense Guidance.

Warning Order – a. A preliminary notice of an order or action which is to follow.

b. A directive used by commanders to advise subordinates of impending action. The JCS may use the warning order as a planned directive to initiate Phase III of the Crisis Action Procedures, Course of Action Development.

NOTE: Definitions derived from the Desktop Reference Book (9) and Joint Pub 1-02 (19).

Appendix H - Abbreviations

AAFIF – Automated Airfield Information File
ADP – Automated Data Processing
AL/HRG – Armstrong Laboratory, Logistics Research Division
ALLRS – Automated Lessons Learned Recording System
AOR – Area of Responsibility

BCAT – Beddown Capability Assessment Tool
BPT – Beddown Planning Tool
BSP – Base Support Plan
BSPBT – Base Support Planning Browsing Tool
BSPC – Base Support Planning Council
BSPCT – Base Support Plan Collection Tool

CAP – Crisis Action Planning
CG – Chairman's Guidance
CINC – Commander in Chief
CJCS – Chairman of the Joint Chiefs of Staff
COA – Course of Action
COB – Collocated Operating Base
CONOPs – Concept of Operations
CPA – Chairman's Program Assessment
CPG – Contingency Planning Guidance

DISE – Deployed Information and Support Environment
DKB – Deployment Knowledge Base
DoD – Department of Defense
DPG – Defense Planning Guidance
DPRB – Defense Planning Resource Board

ECLIPSE – Enhanced Contingency Logistics Planning and Support Environment
EKB – Employment Knowledge Base

GCCS – Global Command and Control System

JCS – Joint Chiefs of Staff
JOPES – Joint Operational Planning and Execution System
JSCP – Joint Strategic Capabilities Plan
JSPS – Joint Strategic Planning System
JSR – Joint Strategy Review
JULLS – Joint Universal Lessons Learned System

LIMFAC – Limiting Factor
LOG-AID – Logistics Analysis to Improve Deployability
LOGCAT – Logisticians' Contingency Assessment Tool

MAFIS – Multimedia Air Field Information System
MAJCOM – Major Command
MOB – Main Operating Base

NAF – Numbered Air Force
NCA – National Command Authority
NMCC – National Military Command Center
NMSD – National Military Strategy Document
NSC – National Security Council
NSCS – National Security Council System
NSDD – National Security Decisions Document

OPLAN – Operational Plan
OPORD – Operational Order

PDM – Program Decision Memorandum
POM – Program Objective Memorandum
PPBS – Planning, Programming, and Budgeting System

SECDEF – Secretary of Defense
STEP – Survey Tool for Employment Planning

TPFDD – Time Phased Force Deployment Document

USTRANSCOM – United States Transportation Command
USAF – United States Air Force
UTC – Unit Type Code
UTC-DT – Unit Type Code – Development and Tailoring
UTC-DTO – Unit Type Code – Development, Tailoring, and Optimization

WAAR – Wartime Aircraft Activity Report
WMP – War Mobilization Plan
WRM – War Reserve Materiel

Appendix J – Participating Experts

The following table is a list of functional experts who provided their knowledge and expertise to help develop and provide resources for this research. Without there help, this endeavor would not have been possible.

Table J-1 – Participating Experts

Name	Office
Lt Col Anthony Dronkers	HQ USAF/ILXX
Lt Col Carl Garrison	CADRE/CWPC
Lt Col Russell Grunch	607 ASUS/CC
Maj Sean P. Cassidy	HQ PACAF/LGXW
Maj. Chuck Hunter	HQ USAFE/LGXS
Maj Phil Moore	USCENTAF/LGXX
Maj Steve Wells	AFSOC/LGXX
Capt Joe Martin	ALHRG
Capt Jennifer Murphy	USCENTAF/A-4 LGXX
SMSgt (select) Keith Echols	USCENTAF/A-4 LGXP
MSgt Frederick J. Hoffman III	51 LSS/LGX

References

1. 344th Technical Training Squadron, Logistics Plans and Programs Officer Course, Block II – Planning, Study Guide and Workbook. AETC, Lackland AFB TX, May 1993.

2. Air Combat Command. Base Support Planning. ACCI 10-404, Langley AFB VA: HQ ACC/LGXX, 16 August 1996.

3. Banks, Jerry, John S. Carson, II and Barry L. Nelson. Discrete-Event System Simulation (Second Edition). Upper Saddle River NJ: Prentice-Hall, 1996.

4. Barthelmess, Lt Col Bob. Class handout, Contingency War Planning Course, IP-5000, Crisis Action Procedures. Air University, College of Aerospace Doctrine, Research, and Education (CADRE), 31 January 1995.

5. Barthelmess, Lt Col Bob. Class handout, Contingency War Planning Course, IP-3100, Joint Strategic Planning System (JSPS). Air University, College of Aerospace Doctrine, Research, and Education (CADRE), 5 April 1995.

6. Cassidy, Maj Sean P. HQ PACAF/LGXW, "PACAF BSP History," Slide Presentation at the Worldwide Base Support Planning Conference, USCENTAF, Shaw AFB SC, 14-16 January 1997.

7. Department of the Air Force. Operation Plan and Concert Plan Development and Implementation. AFM 10-401, Washington: HQ USAF/XOX, 28 October 1994.

8. Department of the Air Force. Base Support Planning. AFI 10-404 (Draft).

9. Department of the Air Force. Base Support Planning. AFI 10-404, Washington: HQ USAF/LGXX, 16 November 1994.

10. Desktop Reference Book. Class handout, Contingency War Planning Course. Air University, College of Aerospace Doctrine, Research, and Education (CADRE), 1 June 1994.

11. Devore, Jay L. Probability and Statistics for Engineering and the Sciences (Fourth Edition). Belmont CA: Wadsworth Publishing Company, 1995.

12. Dronkers, Lt Col Anthony. Headquarters United States Air Force. World Wide Base Support Planning Conference Minutes (14 - 16 Jan 97). Washington DC, 11 February 97.

13. Dumville, James C. "A PERT Statistical Analysis: The Probability That a Non-Critical Path Will Emerge Critical," Logistics Spectrum, 23-31 (Spring 1992).

14. Foote, Capt Wayne C. "Planning Reception, Beddown, and Support of Contingency Operations," Air Force Journal of Logistics, 1-6 (Summer 1993).

15. Giammalvo, Paul D., and others. "Implementation of a Continuous Process Improvement Program Using Data From CPM Schedules," Project Management Journal, 24-34 (June 1996).

16. Hagel, Major Stephen J. "Capturing Logistics Data: Part II," Air Force Journal of Logistics, 1-9 (Winter 1992).

17. Hartley, H. O. and A. W. Wortham. "A Statistical Theory for PERT Critical Path," Management Science, B469-B481 (June 1966).

18. Hill, Kenneth G. Class handout, Contingency War Planning Course, IP-3400, Planning, Programming, and Budgeting System (PPBS). Air University, College of Aerospace Doctrine, Research, and Education (CADRE), 22 March 1995.

19. Hoffmaster, Lt Col John. Class handout, Contingency War Planning Course, IP-3200, Joint Operation Planning and Execution System (JOPES). Air University, College of Aerospace Doctrine, Research, and Education (CADRE), 15 March 1995.

20. Joint Chiefs of Staff. Department of Defense Dictionary of Military and Associated Terms. Joint Pub 1-02. Washington: JCS, 23 March 1994.

21. Joint Chiefs of Staff. Joint Operations Planning and Execution System. Volume 1 – Planning Policies and Procedures. Joint Pub 5-03.1. Washington: JCS, 4 August 1993.

22. Kerzner, Harold. Project Management: A Systems Approach to Planning, Scheduling, and Controlling (Fourth Edition). New York: Van Nostrand Reinhold, 1992.

23. Krajewski, Lee J. and Larry P. Ritzman. Operations Management: Strategy and Analysis (Fourth Edition). Reading MA: Addison-Wesley Publishing Company, 1996.

24. Lloyd, Capt Bradley A., Capt William Z. Zeck, Patrick K. Clark, Jeffrey E. Sumner, Kerris J. Renken, Nicholas J. Stute, John E. Guiliano. The Enhanced Contingency Logistics Planning and Support Environment (ECLIPSE): The Vision. Contract No. F33657-92-D-2055. AFMC, Wright-Patterson AFB OH, January 1995.

25. Microsoft Excel User's Guide. Version 7.0. Microsoft Corporation, 1995.

26. Murphy, Capt Jennifer. USCENTAF/A-4 LGX, " USCENTAF (A4-LGX) Logistics Plans," Slide Presentation at the Worldwide Base Support Planning Conference, USCENTAF, Shaw AFB SC, 14-16 January 1997.

27. Naylor, Thomas H. And J. M. Finger. "Verification of Computer Simulation Models," Management Science: Application, B92-B101 (October 1967).

28. Pacific Air Forces. Base Support Planning. PACAFI 10-404. Hickam AFB HI: HQ PACAF/LGXX, 3 June 1996.

29. Pritsker, A. Alan B. Introduction to Simulation and SLAM II (Third Edition). New York: John Wiley & Sons, 1986.

30. Synergy Inc. Logistics Analysis to Improve Deployability (LOG–AID): Background Paper. Contract No. F41264-96-C-5000. Washington: 14 Mar 1997.

31. Sytsma, Sid. "Probabilistic Solutions to Project Scheduling -- Simulation Using Excel." WWWeb, http://www.sytsma.com/cism640/CPMSTUFF/cpmsim.htm (02 July 97).

32. Talley, Mark S. Expert Opinion on Elements Required to Develop a Base Support Plan Training Guide. MS thesis, AFIT/GLM/LSM/89S-65. School of Logistics and Acquisition Management, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, September 1989 (AD-A215166).

33. Van Slyke, Richard M. "Monte Carlo Methods and the PERT Problem," Operations Research, 839-860 (September-October 1963).

Vita - Kalosky

Captain Daniel T. Kalosky was born on 13 October 1962 in Detroit, Michigan. In 1980 he graduated from Farmington High School, Farmington, Michigan and enlisted in the United States Air Force. After basic and technical training, he served two assignments as a B-52 Bombing and Navigation Systems Technician at Fairchild AFB, Washington and Wurtsmith AFB, Michigan. While at Wurtsmith AFB, then Technical Sergeant Kalosky received his Bachelors of Science in Mathematics in 1992 from The University of the State of New York - Regents College and was selected to attend Officer Training School. He received his commission on 28 July 1993.

Captain Kalosky's first assignment after graduating from the Aircraft Maintenance Officer Course, Sheppard AFB, Texas, was back to Fairchild AFB at the 92nd Air Refueling Squadron. He held the positions of Chief of Sortie Generation and Sortie Support Flights along with Deputy Chief of Logistics Plans on the 92nd Air Refueling Wing Staff. He was selected to attend the Air Force Institute of Technology at Wright-Patterson AFB, Ohio in 1996. He graduated in 1997 with a Masters degree in Logistics Management and was subsequently assigned to the Electronic Systems Center, Hanscom AFB, Massachusetts.

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Vita -Walker

First Lieutenant Patrick G. Walker was born 15 July 1964 in West Berlin, Germany. He graduated from Wuerzberg American High School in 1982 and went on to earn an Associate Degree in Fine Arts at the University of Maryland, Munich Campus in June 1984. He enlisted in the United States Air Force in March 1988 serving a tour of duty at the 1 SOW, Hurlburt Field, Florida from August of 1988 to August of 1991 as a weapons control systems mechanic for the AC-130H. He exited service to join the Air Force Reserve Officer Training Corps at Troy State University, Troy, Alabama and earned a Bachelor of Arts degree in Physical Science. He was commissioned 15 July 1993.

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13. ABSTRACT (*Maximum 200 Words*)
The base support plan (BSP) is the installation level plan to support unified and specified command wartime operations plans, as well as MAJCOM supporting plans. Two Armstrong Laboratory sponsored initiatives exist to automate and enhance some of the BSP processes: the Survey Tool for Employment Planning (STEP) and Beddown Capability and Assessment Tool (BCAT). This research explored the BSP process and improvement initiatives by (1) flowcharting the current process, (2) establishing where in the current process STEP and BCAT play a role, (3) developing a spreadsheet model of the process using Microsoft Excel and the program evaluation and review technique (PERT) for quantifying any possible BSP scenario, and (4) computing the estimated time savings STEP and BCAT can provide the USAF. The results of this research are threefold. First, a detailed BSP process map now exists filling a void experienced by logistics planners at all levels. Second, a model using Excel and PERT is available for users interested in improving their BSP process. This model can be adapted to any BSP scenario. And, finally, the model showed the average time to complete a BSP with and without STEP and BCAT are significantly different.

14. Subject Terms
Base Support Plan (BSP), Program Evaluation and Review Technique (PERT), Survey Tool for Employment Planning (STEP), Beddown Capability and Assessment Tool (BCAT), logistics plans, Microsoft Excel, planning

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